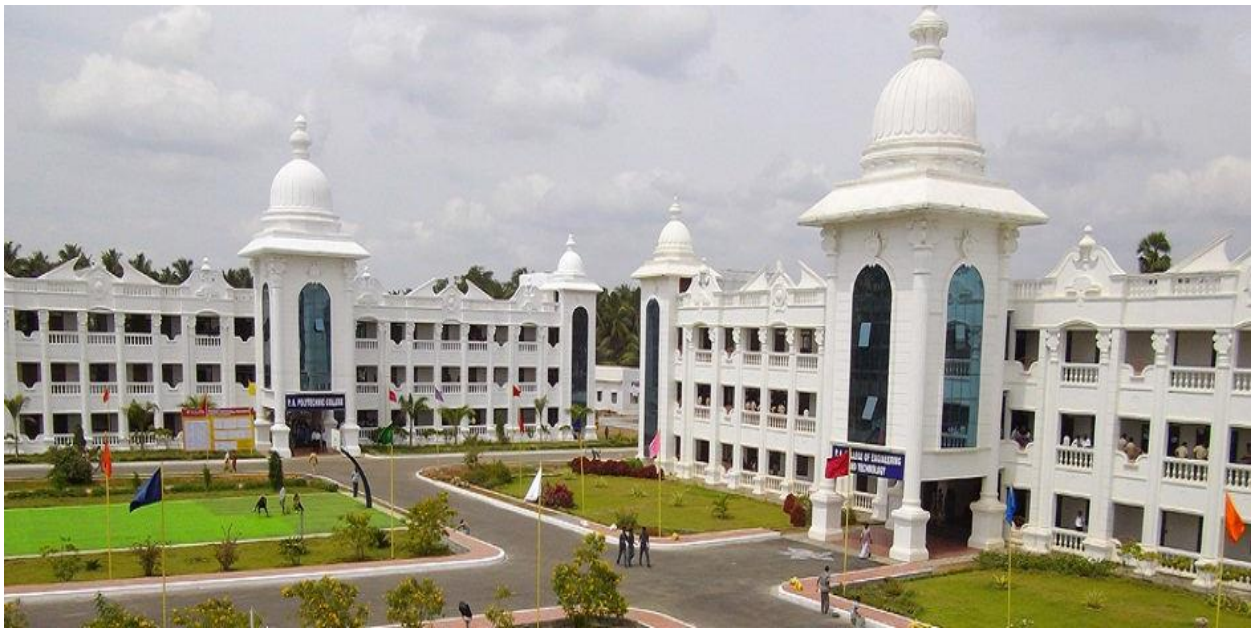
P. A. COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution, Affiliated to Anna University, Chennai)
An ISO 9001:2015 Certified Institution - Accredited by NBA and NAAC with 'A' Grade
Pollachi – 642 002



B. E. COMPUTER SCIENCE AND ENGINEERING

CURRICULA AND SYLLABI

(I to VIII Semester)

REGULATION

2019

Vision and Mission of the Institute and Department

Vision of the Institute

To progress to become a center of excellence in Engineering and Technology through creative and innovative practices in teaching-learning process and promoting research and development to produce globally competitive and employable professionals who are psychologically strong and emotionally balanced with social perception and professional ethics.

Mission of the Institute

To offer academic programmes, in the emerging areas of Engineering and Technology, provide training and research facilities and opportunities to promote student and faculty research in collaboration with Industry and Government for sustainable growth.

Vision of the Department

To become a Center of Excellence in the field of Computer Science and Engineering through value based teaching-learning process, facilitating innovative research and development, encouraging and molding young minds with ethical values, to be future-ready to take challenges as opportunities.

Mission of the Department

To produce competent and quality professionals by imparting excellent computer education, problem solving techniques, ability to design and work with modern tools, inventive technologies and to develop innovative research capabilities, leadership and entrepreneurial abilities with ethical values.

Program Educational Objectives (PEO)

The objectives of the programme are to provide the following to the students:

PEO 1: To make students as well-equipped computer professionals by providing comprehensive knowledge in Mathematics, Science and Engineering to find the solutions to the real-time computing problems.

PEO 2: To enhance students to be capable of transforming their gained knowledge into skills in order to work with modern tools and technologies to impart innovative research capabilities.

PEO 3: To provide all-round development thereby students are motivated to choose their career as entrepreneurs and technocrats with ethical values and to adapt themselves to rapidly changing work environment for benefit of the society.

Program Specific Outcomes (PSO):

The following outcomes of the programme are provided to the students:

PSO 1: To analyze and develop essential proficiency skills in the areas related to engineering science, communicating the earned knowledge, algorithms and analysis, system software, networking and data science and to apply the knowledge based skill to solve real time problems.

PSO 2: To ensure programming skills for the software development using modern computer languages, tools and platforms.

PSO 3: To use the knowledge in research and product development accompanying ethical values as to benefit the society.

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.

SEMESTER I

Sl.No.	COURSE CODE	COURSE TITLE	L	T	P	C
		Induction Programme	0	0	0	0
THEORY						
1	19CAHS001	Communicative English	3	0	0	3
2	19CABS001	Engineering Mathematics - I	3	1	0	4
3	19CSBS103	Engineering Physics	3	0	0	3
4	19CAES003	Programming for Problem Solving	3	0	0	3
PRACTICAL						
5	19CABS004	Physics Laboratory	0	0	3	1.5
6	19CAES005	Workshop Practice	0	0	4	2
7	19CAES006	Programming in C Laboratory	0	0	3	1.5
		Total	**12**	**1**	**10**	**18**

SEMESTER II

Sl.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	19CABS006	Engineering Chemistry	3	0	0	3
2	19CABS007	Engineering Mathematics - II	3	1	0	4
3	19CSES203	Fundamentals of Electrical and Electronics Engineering	3	0	0	3
4	19CAES007	Engineering Graphics	2	0	4	4
5	19CSPC205	Python Programming	2	0	2	3
PRACTICAL						
6	19CABS005	Chemistry Laboratory	0	0	3	1.5
7	19CSES207	Fundamentals of Electrical and Electronics Engineering Laboratory	0	0	3	1.5
		Total	**13**	**1**	**12**	**20**

SEMESTER III

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	19CABS008	Transforms and Partial Differential Equations	3	0	0	3
2	19CSES302	Digital Principles and System Design	3	0	0	3
3	19CSPC303	Data Structures	3	0	0	3
4	19CSPC304	Computer Organization and Architecture	3	0	0	3
5	19CSPC305	Object Oriented Programming	3	0	0	3
6	19CAHS002	Environmental Science and Engineering	3	0	0	3
PRACTICAL						
7	19CSPC307	Data Structures Laboratory	0	0	3	1.5
8	19CSPC308	Object Oriented Programming Laboratory	0	0	3	1.5
9	19CSES309	Digital Systems Laboratory	0	0	3	1.5
		Total	**18**	**0**	**9**	**22.5**

SEMESTER IV

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	19CSBS401	Discrete Mathematics	3	0	0	3
2	19CSPC402	Operating Systems	3	0	0	3
3	19CSPC403	Database Management Systems	3	0	0	3
4	19CSPC404	Design and Analysis of Algorithms	3	0	0	3
5	19CSES405	Microprocessor and Microcontroller	3	0	0	3
6	19CSMC406	Constitution of India	3	0	0	0
PRACTICAL						
7	19CSPC407	Operating Systems Laboratory	0	0	3	1.5
8	19CSPC408	Database Management Systems Laboratory	0	0	3	1.5
9	19CSES409	Microprocessor and Microcontroller Laboratory	0	0	3	1.5
		Total	**18**	**0**	**9**	**19.5**

SEMESTER V

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	19CSBS501	Probability and Queueing Theory	3	1	0	4
2	19CSPC502	Web Programming	3	0	0	3
3	19CSPC503	Computer Networks	3	0	0	3
4	19CSPC504	Theory of Computation	3	0	0	3
5	19CSPE5XX	Professional Elective - I	3	0	0	3
6		Open Elective I	3	0	0	3
PRACTICAL						
7	19CSPC505	Web Programming Laboratory	0	0	3	1.5
8	19CSPC506	Computer Networks Laboratory	0	0	3	1.5
9	19CAHS003	Communication Skills Laboratory	0	0	2	1
		Total	**18**	**1**	**8**	**23**

SEMESTER VI

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	19CSPC601	Artificial Intelligence	3	0	0	3
2	19CSPC602	Compiler Design	3	0	0	3
3	19CSPC603	Mobile Computing	3	0	0	3
4	19CSPC604	Software Engineering	3	0	0	3
5	19CSPE6XX	Professional Elective - II	3	0	0	3
6		Open Elective II	3	0	0	3
PRACTICAL						
7	19CSPC605	Mobile Application Development Laboratory	0	0	3	1.5
8	19CSPC606	Compiler Design Laboratory	0	0	3	1.5
		Total	**18**	**0**	**6**	**21**

SEMESTER VII

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	19CSPC701	Cryptography and Network Security	3	0	0	3
2	19CSPC702	Data Analytics	3	0	0	3
3	19CSHS703	Principles of Management	3	0	0	3
4	19CSPE7XX	Professional Elective - III	3	0	0	3
5	19CSPE7XX	Professional Elective - IV	3	0	0	3
6		Open Elective III	3	0	0	3
PRACTICAL						
7	19CSPC704	Security Laboratory	0	0	3	1.5
8	19CSPC705	Data Analytics Laboratory	0	0	3	1.5
9	19CAEE001	Professional Readiness for Innovation, Employability and Entrepreneurship	0	0	6	3
		Total	**18**	**0**	**12**	**24**

SEMESTER VIII

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	19CSPE8XX	Professional Elective - V	3	0	0	3
2	19CSPE8XX	Professional Elective - VI	3	0	0	3
3		Open Elective IV	3	0	0	3
PRACTICAL						
4	19CSEE801	Project Work	0	0	16	8
		Total	**9**	**0**	**16**	**17**

Total Credits: 18+20+22.5+19.5+23+21+24+17=165

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT (HS)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CAHS001	Communicative English	3	0	0	3
2	19CAHS002	Environmental Science and Engineering	3	0	0	3
3	19CAHS003	Communication Skills Laboratory	0	0	2	1
4	19CSHS703	Principles of Management	3	0	0	3

BASIC SCIENCES (BS)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CABS001	Engineering Mathematics - I	3	1	0	4
2	19CSBS103	Engineering Physics	3	0	0	3
3	19CABS004	Physics Laboratory	0	0	3	1.5
4	19CABS006	Engineering Chemistry	3	0	0	3
5	19CABS007	Engineering Mathematics – II	3	1	0	4
6	19CABS005	Chemistry Laboratory	0	0	3	1.5
7	19CABS008	Transforms and Partial Differential Equations	3	0	0	3
8	19CSBS401	Discrete Mathematics	3	0	0	3
9	19CSBS501	Probability and Queueing Theory	3	1	0	4

ENGINEERING SCIENCES (ES)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CAES003	Programming for Problem Solving	3	0	0	3
2	19CAES005	Workshop Practice	0	0	4	2
3	19CAES006	Programming in C Laboratory	0	0	3	1.5
4	19CSES203	Fundamentals of Electrical and Electronics Engineering	3	0	0	3
5	19CAES007	Engineering Graphics	2	0	4	4
6	19CSES207	Fundamentals of Electrical and Electronics Engineering Laboratory	0	0	3	1.5
7	19CSES302	Digital Principles and System Design	3	0	0	3
8	19CSES309	Digital Systems Laboratory	0	0	3	1.5

9	19CSES405	Microprocessor and Microcontroller	3	0	0	3
10	19CSES409	Microprocessor and Microcontroller Laboratory	0	0	3	1.5

PROFESSIONAL CORES (PC)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CSPC205	Python Programming	2	0	2	3
2	19CSPC303	Data Structures	3	0	0	3
3	19CSPC304	Computer Organization and Architecture	3	0	0	3
4	19CSPC305	Object Oriented Programming	3	0	0	3
5	19CSPC307	Data Structures Laboratory	0	0	3	1.5
6	19CSPC308	Object Oriented Programming Laboratory	0	0	3	1.5
7	19CSPC402	Operating Systems	3	0	0	3
8	19CSPC403	Database Management Systems	3	0	0	3
9	19CSPC404	Design and Analysis of Algorithms	3	0	0	3
10	19CSPC407	Operating Systems Laboratory	0	0	3	1.5
11	19CSPC408	Database Management Systems Laboratory	0	0	3	1.5
12	19CSPC502	Web Programming	3	0	0	3
13	19CSPC503	Computer Networks	3	0	0	3
14	19CSPC504	Theory of Computation	3	0	0	3
15	19CSPC505	Web Programming Laboratory	0	0	3	1.5
16	19CSPC506	Computer Networks Laboratory	0	0	3	1.5
17	19CSPC601	Artificial Intelligence	3	0	0	3
18	19CSPC602	Compiler Design	3	0	0	3
19	19CSPC603	Mobile Computing	3	0	0	3
20	19CSPC604	Software Engineering	3	0	0	3
21	19CSPC605	Mobile Application Development Laboratory	0	0	3	1.5
22	19CSPC606	Compiler Design Laboratory	0	0	3	1.5
23	19CSPC701	Cryptography and Network Security	3	0	0	3
24	19CSPC702	Data Analytics	3	0	0	3

25	19CSPC704	Security Laboratory	0	0	3	1.5
26	19CSPC705	Data Analytics Laboratory	0	0	3	1.5

PROFESSIONAL ELECTIVE(PE) – I (SEMESTER V)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CSPE501	Object Oriented Analysis and Design	3	0	0	3
2	19CSPE502	Graphics and Multimedia	3	0	0	3
3	19CSPE503	Advanced Algorithms	3	0	0	3
4	19CSPE504	Data Warehousing and Data Mining	3	0	0	3
5	19CSPE505	Algebra and Number Theory	3	0	0	3

PROFESSIONAL ELECTIVE(PE) – II (SEMESTER VI)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CSPE601	Digital Signal Processing	3	0	0	3
2	19CSPE602	Adhoc and Sensor Networks	3	0	0	3
3	19CSPE603	Distributed Systems	3	0	0	3
4	19CSPE604	Cloud Computing	3	0	0	3
5	19CSPE605	Graph Theory and Applications	3	0	0	3

PROFESSIONAL ELECTIVE(PE) – III (SEMESTER VII)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CSPE701	Game Programming	3	0	0	3
2	19CAPE001	Soft Computing	3	0	0	3
3	19CSPE703	Service Oriented Architecture	3	0	0	3
4	19CSPE704	Multi-Core Architecture	3	0	0	3
5	19CSPE705	High Performance Computing	3	0	0	3

PROFESSIONAL ELECTIVE(PE) – IV (SEMESTER VII)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CSPE706	Bioinformatics	3	0	0	3
2	19CSPE707	Digital Image Processing	3	0	0	3
3	19CSPE708	C# and .Net Programming	3	0	0	3
4	19CSPE709	Software Project Management	3	0	0	3
5	19CSPE710	Human Computer Interaction	3	0	0	3

PROFESSIONAL ELECTIVE(PE) – V (SEMESTER VIII)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CAHS004	Professional Ethics in Engineering	3	0	0	3
2	19CSPE802	Natural Language Processing	3	0	0	3
3	19CSPE803	Information Security	3	0	0	3
4	19CSPE804	Business Intelligence	3	0	0	3
5	19CSPE805	Agile Methodologies	3	0	0	3

PROFESSIONAL ELECTIVE(PE) -VI (SEMESTER VIII)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CSPE806	Information Retrieval Techniques	3	0	0	3
2	19CSPE807	Robotics and its Applications	3	0	0	3
3	19CAPE002	Intellectual Property Rights	3	0	0	3
4	19CSPE809	Machine Learning Techniques	3	0	0	3
5	19CSPE810	Social Network Analysis	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EE)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CSEE801	Project Work	0	0	16	8
2	19CAEE001	Professional Readiness for Innovation, Employability and Entrepreneurship	0	0	6	3

OPEN ELECTIVES (OE)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CEOE01	Geographical Information System	3	0	0	3
2	19CEOE02	Green Buildings	3	0	0	3
3	19CEOE03	Planning of Smart Cities	3	0	0	3
4	19CEOE04	Vastu Science for Building Construction	3	0	0	3
5	19CEOE05	Disaster Management and Mitigation	3	0	0	3
6	19CSOE06	Open Source Technologies	3	0	0	3
7	19CSOE07	Ethical Hacking	3	0	0	3
8	19CSOE08	Internet of Things	3	0	0	3
9	19CSOE09	Software Testing	3	0	0	3
10	19CSOE10	User Interface Design	3	0	0	3
11	19ECOE11	Automotive Electronics	3	0	0	3
12	19ECOE12	Hardware Descriptive Language	3	0	0	3
13	19ECOE13	Embedded System Design using ARM Processor	3	0	0	3
14	19ECOE14	Bio-Inspired Computing Technologies	3	0	0	3
15	19ECOE15	Vehicular Communication and Networking Technology	3	0	0	3
16	19EEOE16	Energy Efficient Lighting System	3	0	0	3
17	19EEOE17	Sensors and Transducers	3	0	0	3
18	19EEOE18	Electrical Safety	3	0	0	3
19	19EEOE19	Electric Vehicles	3	0	0	3
20	19EEOE20	SCADA System and Application Management	3	0	0	3
21	19MEOE21	Testing of Materials	3	0	0	3
22	19MEOE22	Robotics	3	0	0	3
23	19MEOE23	Industrial Engineering	3	0	0	3
24	19MEOE24	Marketing Management	3	0	0	3
25	19MEOE25	Energy Conservation and Management	3	0	0	3

MANDATORY COURSES (MC) (NO - CREDIT)

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	19CSMC406	Constitution of India	3	0	0	0

VALUE ADDED COURSES (VA)

Sl.No.	SUBJECT CODE	COURSE TITLE	CREDITS			
			L	T	P	C
1	19CSVAX01	Android Application Development	1	0	0	1
2	19CSVAX02	Multimedia Systems	1	0	0	1
3	19CSVAX03	Software Testing Tools	1	0	0	1
4	19CSVAX04	CISCO Networking	1	0	0	1
5	19CSVAX05	.NET Programming	1	0	0	1
6	19CSVAX06	Node JS & Angular JS	1	0	0	1
7	19CSVAX07	Virtual Machine Fundamentals	1	0	0	1
8	19CSVAX08	Software Product Development and Management	1	0	0	1
9	19CSVAX09	IOT for Telecommunication Systems	1	0	0	1
10	19CSVAX10	Social and Psychological Well Being	1	0	0	1
11	19CSVAX11	NPTEL Courses Relevant to CSE	1	0	0	1

SUMMARY OF CREDIT DISTRIBUTION

S.No.	Course Work Subject Area	CREDITS PER SEMESTER								Total Credits	% of Credits	Credit Range	
		I	II	III	IV	V	VI	VII	VIII			PA	AICTE
1	**HS**	3		3		1		3		**10**	6.06	**10**	12
2	**BS**	8.5	8.5	3	3	4				**27**	16.36	**27**	25
3	**ES**	6.5	8.5	4.5	4.5					**24**	14.54	**24**	24
4	**PC**		3	12	12	12	15	9		**63**	38.18	**63**	48
5	**PE**					3	3	6	6	**18**	10.90	**18**	18
6	**OE**					3	3	3	3	**12**	7.27	**12**	18
7	**EE**							3	8	**11**	6.67	**11**	15
8	**MC**				0					**0**	**-**	**0**	-
	Total	**18**	**20**	**22.5**	**19.5**	**23**	**21**	**24**	**17**	**165**	100	**165**	160

BS – Basic Sciences; HS – Humanities and Social Sciences including Management ;
ES – Engineering Sciences; PC – Professional Cores; PE – Professional Electives ;
OE – Open Electives; EE – Employability Enhancement Courses ;
MC – Mandatory Courses; VA – Value Addd Courses

INDUCTION PROGRAMME **SEMESTER I**

Number of Days **21 Days**

Activities:

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

19CAHS001 COMMUNICATIVE ENGLISH SEMESTER I

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To make learners acquire listening skills with correct pronunciation, stress and Intonation.
- To emphasize the development of speaking skills amongst the learners of Engineering.
- To inculcate the habit of reading for effective and efficient communication.
- To equip the learners with writing skills needed for academic as well as work place contexts.
- To enable learners to fine-tune their linguistic skills with appropriate grammatical usage.

UNIT-I: LISTENING 9

Listening Comprehension, Pronunciation, Intonation, Stress, Pause, Rhythm, Listening to Short & Long Conversations/Monologues- Note -Taking.

UNIT-II: SPEAKING 9

Self Introduction, Making Oral & Formal Presentation, Communication at Work Place, Mock Interviews, Role Play Activities, Group Discussions, Debates, Delivering Welcome Address, Proposing Vote of Thanks, Introducing the Chief Guest at a function.

UNIT-III: READING 9

Reading Comprehension, Speed Reading, Interpreting Visual Materials (Signs, Post Cards, Pictures, and Labels Etc), Reading for Specific Information, Reading to identify Stylistic Features (Syntax, Lexis and Sentence Structures), Cloze Test.

UNIT-IV: WRITING 9

Phrase, Clause and Sentence Structures, Punctuation, Discourse Markers, Coherence, Precision in Writing, Graph & Process Description, Definition, Writing E-mail, Paraphrasing, Note-making, Job Application with Resume, Writing Review of a Book/Movie, Creative Writing.

UNIT-V: GRAMMAR AND VOCABULARY 9

Word Formation with Prefix and Suffix, Synonyms and Antonyms, Tenses, Parts of Speech, Common Errors in English (Subject-Verb Agreement, Noun-Pronoun Agreement, Prepositions, Articles, Conditional statements, Redundancies, Clichés etc), Voices.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Board of Editors, Using English, Orient Black Swan, 2015.
2. Practical English Usage, Michael Swan, OUP 1995.
3. Cambridge BEC Vantage Practice Tests, Self-study Edition, CUP, 2002.
4. Exercises in Spoken English. Parts 1-II, EFLC, Hyderabad, OUP, 2014.
5. Indlish. JyothiSanyal, Viva Books, 2006.
6. Communicative English. J. Anbazhagan Vijay, Global Publishers, Chennai 2018.

WEB REFERENCES:

1. www.cambridgeenglish.org/exams/
2. www.examenglish.com/BEC/BEC_Vantage.html
3. www.splendid-speaking.com/exams/bec_ speaking.html

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Listen and comprehend the contexts delivered in English

CO2: Speak clearly, confidently, comprehensively and communicate with one or many listeners using appropriate communicative strategies

CO3: Read different genres of texts adopting various reading strategies

CO4: Write effectively and persuasively to enhance students' employability

CO5: Communicate cohesively, coherently and flawlessly avoiding grammatical errors and using a wide vocabulary range in speaking and writing contexts.

19CABS001 ENGINEERING MATHEMATICS - I SEMESTER I

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- To be familiarize with differentiation of single variable and its applications.
- To acquire knowledge of differentiation for more than one variable and its applications.
- To obtain the knowledge of definite and improper integration.
- To acquire the knowledge of multiple integration and related applications.
- To gain methods to solve differential equations with constant and variable coefficients.

UNIT-I: DIFFERENTIAL CALCULUS 9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT-II: FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial differentiation - Homogeneous functions and Euler‘s theorem - Total derivative - Change of variables - Jacobians - Partial differentiation of implicit functions - Taylor‘s series for functions of two variables - Maxima and minima of functions of two variables - Lagrange‘s method of undetermined multipliers.

UNIT-III: INTEGRAL CALCULUS 9+3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration : Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT-IV: MULTIPLE INTEGRALS 9+3

Double integrals - Change of order of integration - Double integrals in polar coordinates -Area enclosed by plane curves - Triple integrals - Volume of solids - Change of variables in double and triple integrals.

UNIT-V: DIFFERENTIAL EQUATIONS 9+3

Higher order linear differential equations with constant coefficients - Method of variation of parameters - Homogenous equation of Euler’s and Legendre’s type - System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

Contact Periods:

Lecture: 45 Periods Tutorial: 15 Periods Practical: 0 Periods Total: 60 Periods

REFERENCES:

1. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publisher, 43rd Edition, 2010.
2. James Stewart, “Calculus: Early Transcendentals”, Cengage Learning, 7th Edition, New Delhi, 2015.
3. Anton, H, Bivens, I and Davis, S, “Calculus”, Wiley, 10th Edition, 2016.
4. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 3rd Edition, 2007.
5. Narayanan, S. and ManicavachagomPillai, T. K., “Calculus” Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
6. Srimantha Pal and Bhunia, S.C, “Engineering Mathematics” Oxford University Press, 2015.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Understand the limit definition and rules of differentiation to differentiate functions

CO2: Apply differentiation to solve maxima and minima problems

CO3: Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts

CO4: Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates,

CO5: Apply various techniques in solving differential equations.

19CSBS103 ENGINEERING PHYSICS SEMESTER I

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the properties of electronic materials.
- To analyze the properties and applications of semiconductors.
- To gain knowledge in the application of magnetic and superconducting materials.
- To know about the measurement of various parameters related to semiconductors.
- To understand the applications and properties of engineered semiconductor materials and nano materials.

UNIT-I: ELECTRONIC MATERIALS 9

Classical Free electron theory of metals - Postulates-Electrical and Thermal conductivity of metals - Derivation of Wiedemann-Franz law-Lorentz number-Drawbacks of Classical theory-Occupation probability- Effect of temperature- Density of energy states in meals (derivation) – Carrier concentration in metals- Calculation of Fermi energy at0K-Types of electronic materials: metals, semiconductors and insulators.

UNIT-II: SEMICONDUCTORS 9

Properties of semiconductors-elemental and compound semiconductor - Direct and indirect band Gaps- Intrinsic and extrinsic semiconductors- Fermi level -Carrier concentration in intrinsic semiconductor - Dependence of Fermi level on temperature - Electrical conductivity-band gap determination - extrinsic semiconductors - Carrier concentration in P type and N type-Semiconductors-Dependence of Fermi level on impurity concentration and temperature for P type and N type semiconductors.

UNIT-III: MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment -Bohr magneton - Dia, Para, and Ferro magnetic materials-Domain Theory of ferromagnetism - Hysteresis - Hard and Soft magnetic materials. Superconductivity- Types of superconductors -BCS theory of superconductivity (qualitative)-properties - Meissner effect, effect of magnetic field and heavy current- Applications of superconductors: Cryotron and Magnetic levitation.

UNIT-IV: MEASUREMENTS 9

Four point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility – Hot Point probe measurement - capacitance-voltage measurements - parameter extraction from diode I-V characteristics -DLTS - Determination of band gap by UV-Vis spectroscopy-absorption/transmission.

UNIT-V: ENGINEERED SEMICONDUCTOR MATERIALS 9

Density of states in 2D, ID and 0D (qualitatively) - Practical examples of low-dimensional systems such as quantum wells, wires, and dots -Nanomaterials - Properties- Methods of synthesize - Top- down & Bottom up Approach -Ball Milling - Chemical vapour deposition - Application of Nanomaterials.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. William D Callister and David G. Rethwisch, "Materials Science & Engineering: An introduction" ,9th Edition, Wiley, 2013.
2. Sze. S. M, "Semiconductor Devices: Physics and Technology", Wiley, 2008.
3. Bhattacharya P., "Semiconductor Optoelectronic Devices", Prentice Hall of India, 1997.
4. Singh J, "Semiconductor Optoelectronics: Physics and Technology". McGraw-Hill Inc 1995.
5. Rajendran. V, "Materials Science", Tata McGraw-Hill Publications, New Delhi, 2017.
6. Jayakumar S, "Materials Science". R.K.Publishers, 2008.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Analyze the properties of conducting materials.
CO2: List and analyze the properties of Semiconducting materials and devices.
CO3: Identify, analyze the properties and applications of magnetic and superconducting materials.
CO4: Interpret the various measuring instruments related to semiconductor parameters.
CO5: List the properties and applications of engineered semiconducting materials

19CAES003 PROGRAMMING FOR PROBLEM SOLVING SEMESTER I

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To develop C Programs using basic programming constructs
- To develop C programs using arrays and strings
- To develop applications in C using functions and pointers.
- To develop program in C using structures and union.
- To perform file handling operations in C and learn dynamically allocated memory techniques.

UNIT-I: BASICS OF C PROGRAMMING 11

Generation and Organization of Computers - Number System - Binary - Decimal - Conversion - Problems. Need for logical analysis and thinking - Algorithm - Pseudo code - Flow Chart. Introduction to programming paradigms: Structure of C program - Data Types - Constants - Enumeration Constants - Keywords - Operators and Expressions - Input / Output statements.

UNIT-II: ARRAYS AND STRINGS 9

Decision making statements - Switch statement - Looping statements - Arrays - Initialization - Declaration - One dimensional and Two dimensional arrays - String: String operations - String Arrays - Simple programs: Sorting - Searching - Matrix operations.

UNIT-III: FUNCTIONS AND POINTERS 9

Introduction to functions: Function prototype, function definition, function declaration, function call, Built-in functions (string functions, math functions) - Recursion - Pointers - Pointer operators - Pointer arithmetic - Arrays and pointers - Array of pointers - Parameter passing: Pass by value, Pass by reference.

UNIT-IV: STRUCTURES AND UNION 9

Structure - Nested structures - Pointer and Structures - Array of structures - Example Program using structures and pointers - Self referential structures - Union - Programs using structures and Unions - Enumeration types - Bit fields - typedefs - Dynamic memory allocation - Storage classes.

UNIT-V: FILE PROCESSING 7

Files: File opening modes - Types of file processing: Sequential access, Random access - Preprocessor directives - Command line arguments.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2. ReemaTheraja "Fundamentals of Computing and Programming in C", Second Edition, Oxford University Press, 2016
3. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 15th revised edition, 2016.
4. Dawn Griffiths, David Griffiths, "Head First C", O'Reilly Publishers, 2012.
5. Paul J. Deitel and Harvey Deitel, "C How to Program", 7th ed., Pearson Education, 2013.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Develop simple applications in C using basic constructs
CO2: Design and implement applications using arrays and strings
CO3: Develop and implement applications in C using functions and pointers.
CO4: Develop applications in C using structures and union.
CO5: Design applications using sequential and random-access file processing.

19CABS004 **PHYSICS LABORATORY** **SEMESTER I**

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

- To understand the physical and thermal properties of matter.
- To calibrate the electrical devices, Laser diffraction and parameters of optical fibers.
- To determine the compressibility of liquids and viscosity of liquids.
- To analyze the band gap energy of semiconductors and thickness of paper.
- To determine the spectral wavelength and dispersive power of prism.

LIST OF EXPERIMENTS:

1. Young's Modulus - Cantilever Bending - Koenig's Method
2. Torsional pendulum - Determination of Rigidity Modulus & Moment of Inertia
3. Young's Modulus - Non Uniform bending Method
4. Lee's Disc method - Thermal conductivity of a bad conductor
5. Ammeter and Voltmeter Calibration - Low Range
6. a) Laser - Particle size Determination
   b) Optical fiber - Determination of NA & Acceptance angle
7. Ultrasonic Interferometer - Velocity of sound & Compressibility of liquids
8. Poiseuille's method - Determination of Coefficient of viscosity of a liquid
9. Determination of Bandgap Energy of Semiconductor
10. Air Wedge - Determination thickness of a paper
11. Spectrometer - Diffraction Grating - Normal Incidence Method
12. Spectrometer - Determination of Dispersive power of a prism

Contact Periods:

Lecture: 0 Periods **Tutorial: 0 Periods** **Practical: 45 Periods** **Total: 45 Periods**

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Determine the physical and thermal properties of matter

CO2: Calibrate electrical measuring instruments and thereby effectively using it for electronic application and understanding the principle of Laser diffraction and propagation through optical fibers and determine its parameters.

CO3: Understand the ultrasonic wave propagation in liquids and determine the viscosity

CO4: Determine the band gap energy of semiconductor materials and thickness of paper

CO5: Identify the spectral wavelength and determine the dispersive power of prism

19CAES005 **WORKSHOP PRACTICE** **SEMESTER I**

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- To provide exposure to the students with hands on various basic engineering practices in Civil, Mechanical and Electrical Engineering.
- To make various basic prototypes in the carpentry trade such as Lap joint, Lap Tee joint, Dove tail joint, Mortise & Tenon and Cross-Lap joint.
- To make various Welding joints and sand mould preparation for various patterns
- To prepare electrical wirings.
- To fabricate various parts like tray, frustum of cone and square box in sheet metal

LIST OF EXPERIMENTS:

1. Introduction to use of tools and equipments in Carpentry, Welding, Foundry and Sheet Metal
2. Safety aspects in Carpentry, Welding and Foundry
3. Half lap Joint and Dove tail Joint in Carpentry
4. Welding of Lap joint, Butt joint and T-joint
5. Preparation of Sand mould for cube, conical bush, pipes and V pulley
6. Fabrication of parts like tray, frustum of cone and square box in sheet metal
7. Electrical wiring – simple house wiring
8. Plumbing
9. CNC Machines demonstration and lecture on working principle.
10. Additive manufacturing demonstration and lecture on working principle.

Contact Periods:

Lecture: 0 Periods **Tutorial: 0 Periods** **Practical: 60 Periods** **Total: 60 Periods**

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Use a variety of the tools and equipment used in sheet metal, welding, foundries, and carpentry.

CO2: Fabricate basic carpentry prototypes such as the lap joint, lap tee joint, dovetail joint, mortise and Tenon, and cross-lap joint.

CO3: Prepare various Welding joints and sand moulds for various patterns.

CO4: Carry out basic home electrical works and appliances and pipe connections including plumbing woks

CO5: Sheet metal fabrication of various parts such as tray, frustum of cone, and square box

19CAES006 PROGRAMMING IN C LABORATORY SEMESTER I

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

- To develop programs in C using basic constructs.
- To develop applications in C using strings, pointers, functions, structures.
- To develop applications in C using file processing.

LIST OF EXPERIMENTS:

1. Programs using I/O statements and expressions.
2. Programs using decision-making constructs.
3. Write a program to find whether the given year is leap year or Not? (Hint: not every centurion year is a leap. For example 1700, 1800 and 1900 is not a leap year)
4. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
5. Check whether a given number is Armstrong number or not?
6. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions:
   i. 5 if it is a perfect cube.
   ii. 4 if it is a multiple of 4 and divisible by 6.
   iii. 3 if it is a prime number.

   Sort the numbers based on the weight in the increasing order as shown below
   <10,its weight>,<36,its weight><89,its weight>
7. Populate an array with height of persons and find how many persons are above the average height.
8. Populate a two dimensional array with height and weight of persons and compute the Body Mass Index of the individuals.
9. Given a string ―a$bcd./fg‖ find its reverse without changing the position of special characters.
   (Example input:a@gh%;j and output:j@hg%;a)
10. Convert the given ecimal number into binary, octal and hexadecimal numbers using user defined functions.
11. From a given paragraph perform the following using built-in functions:
    a. Find the total number of words.
    b. Capitalize the first word of each sentence.
    c. Replace a given word with another word.
12. Solve towers of Hanoi using recursion.
13. Sort the list of numbers using pass by reference.
14. Generate salary slip of employees using structures and pointers.
15. Compute internal marks of students for five different subjects using structures and functions.
16. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using random access file.
17. Count the number of account holders whose balance is less than the minimum balance using sequential access file.
18. **Mini project**
    Create a ―Railway reservation system‖ with the following modules

- Booking
- Availability checking
- Cancellation
- Prepare chart

Contact periods:
Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
CO1: Develop C programs for simple applications making use of basic constructs, arrays and strings.
CO2: Develop C programs involving functions, recursion, pointers, and structures.
CO3: Design applications using sequential and random access file processing.

19CABS006 ENGINEERING CHEMISTRY SEMESTER II

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the principles of electrochemical reactions, electrode potential and applications of EMF measurements.
- To accustom the student about the principles and generation of energy in different types of batteries.
- To obtain the knowledge on concepts of electrochemical reactions, redox reactions in corrosion of materials and methods for corrosion prevention and protection of materials.
- To acquaint the student with the concepts of important photophysical and photochemical processes and elemental analysis using spectroscopy.
- To develop the advanced engineering materials by using silicon wafer techniques.

UNIT-I: ELECTROCHEMICAL CELLS 9

Galvanic cells - redox reactions - electrodes metal and metal ion, hydrogen electrode and calomel electrode - electrode potentials-standard oxidation and reduction potentials - Nernst equation and problems - EMF series and significance - Application of EMF measurements - pH measurement using glass electrode and fluoride measurement by ISE.

UNIT-II: BATTERIES 9

Batteries - components, characteristics - voltage, current, current capacity, power density, energy density, cycle life, shelf life and self discharge. Types of batteries - Primary - Zn/MnO_2, Zn/HgO, Zn/Ag_2O, $Li/SOCl_2$, construction, function and performance comparison - Secondary lead acid, nickel cadmium and lithium ion battery - construction, function and performance comparison.

UNIT-III: CORROSION 9

Corrosion - spontaneity - chemical corrosion - mechanism, nature of oxides – Pilling - Bedworth rule - electrochemical corrosion - mechanism-galvanic series and importance - prevention methods - design of materials, cathodic protection techniques(sacrificial anode and impressed current cathode), inhibitors - Protective coatings - inorganic coating - electroplating - surface preparation and plating method applied to Cr and Ni and galvanizing - organic coating - paints - constituents and functions.

UNIT-IV: SPECTROSCOPIC TECHNIQUES AND APPLICATIONS 9

Beer-Lambert's law - UV Visible spectroscopy and IR spectroscopy – principles - instrumentation (block diagram only) - Flame photometry-principles - instrumentation (block diagram only) - estimation of sodium by flame photometry - atomic absorption spectroscopy - principles instrumentation(block diagram only)-estimation of Ni by atomic absorption spectroscopy.

UNIT-V: SILICON WAFER TECHNOLOGY 9

Silicon for IC chips - single crystal - preparation by czechralsky and float zone processes - wafer preparation, P-N junction formation - ion implantation, diffusion and epitaxial growth techniques - insulator layer by oxidation - printing of circuits by photolithography - masking and electron beam methods - etching by chemical and electrochemical methods.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Jain P.C. and Monica Jain, "Engineering Chemistry", DhanpatRai Publications Pvt. Ltd, New Delhi, 16" Edition, 2017.
2. Dara S.S, Umarae, "Text book of Engineering Chemistry", S. Chand Publications, 2004.
3. Agarwal, C.V, "Chemistry of Engineering Materials", 9" Edition, B.S. Publications, 2006.
4. Kuriakose J.C, and Rajaram J, "Chemistry in Engineering and Technology", vol.1 & I, Tata McGraw Hill Publishing company Pvt. Ltd, New Delhi, 2001.
5. Sharma Y.R,"Elementary Organic Spectroscopy", S. Chand Publications, 2013.
6. Tyagi M.S., "Introduction to semiconductor materials and devices",Wiley India 2012.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Understand the principles of electrochemical cells, EMF measurements and electrode potentials which makes them to apply in experimental instrumentation techniques.

CO2: Know the knowledge about different types of batteries with their functions which is useful for various engineering fields.

CO3: Be familiar with corrosion of the instruments and equipments they use in their field and also to learn the mechanisms and the preventive measures by various techniques.

CO4: Know about the different types of spectroscopic techniques and applications

CO5: Gain the knowledge about the silicon chips and their fabrication methods and to apply in preparation of electrical and electronics instruments.

19CABS007 ENGINEERING MATHEMATICS - II SEMESTER II

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- To obtain the knowledge of Eigen values and diagonalization of a matrix.
- To gain the knowledge of vector differentiation, integration and related applications.
- To be known about analytic functions with properties, construction of analytic function and the knowledge of conformal transformation.
- To obtain the knowledge of Cauchy's integral theorem, calculus of residues and complex integration around unit circle and semicircle.
- To be familiar with techniques of Laplace and Inverse Laplace transformation.

UNIT-I: MATRICES 9+3

Eigen values and Eigenvectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigenvectors - Cayley-Hamilton theorem - Diagonalization of matrices-Reduction of a quadratic form to canonical form by orthogonal transformation -Nature of quadratic forms.

UNIT-II: VECTOR CALCULUS 9+3

Gradient and directional derivative -Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields - Line integral over a plane curve - Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems - Verification and application in evaluating line, surface and volume integrals.

UNIT-III: ANALYTIC FUNCTIONS 9+3

Analytic functions - Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties -Harmonic conjugates - Construction of analytic function -Conformal mapping - Mapping by functions w= z + c, cz ,1/□, z2 - Bilinear transformation.

UNIT-IV: COMPLEX INTEGRATION 9+3

Line integral - Cauchy's integral theorem - Cauchy's integral formula - Taylor's and Laurent's series - Singularities - Residues - Residue theorem - Application of residue theorem for evaluation of real integrals - Use of circular contour and semicircular contour.

UNIT-V: LAPLACE TRANSFORMS 9+3

Existence conditions - Transforms of elementary functions - Transform of unit step function and unit impulse function - Basic properties - Shifting theorems - Transforms of derivatives and integrals - Initial and final value theorems - Inverse transforms -Convolution theorem - Transform of periodic functions - Application to solution of linear second order ordinary differential equations with constant coefficients.

Contact Periods:

Lecture: 45 Periods Tutorial: 15 Periods Practical: 0 Periods Total: 60 Periods

REFERENCES:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 43rd Edition, 2015.
2. Erwinkreyszig, "Advanced Engineering Mathematics", 10th Edition, John Wiley & Son, 2016.
3. Bali N.P , Manish Goyal v and Watkins C., "Advanced Engineering Mathematics", Firewall Media, New Delhi, 7th Edition, 2009.

4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi , 3rd Edition, 2007.
5. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.
6. Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Understand the concept of Eigen values and eigenvectors, diagonalization of a matrix, symmetric matrices, positive definite matrices and similar matrices.

CO2: Acquire knowledge in Gradient, divergence and curl of a vector point function and related identities.

CO3: Understand the properties and formation of analytic function, mappings of standard functions and Bilinear transformation.

CO4: Understand calculus of residues to evaluate contour integration.

CO5: Understand Laplace transform and inverse transform of simple functions, various related theorems and application to differential equations with constant coefficients.

19CSES203 FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER II

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand and analyze basic electric circuits
- To study working principles of Electrical Machines and transformers
- To study working principle of basic electronic systems
- To understand the functioning of power electronic circuits and its applications

UNIT-I: DC CIRCUITS **9**

Electrical Circuit Elements-Voltage and Current Sources-Source transformation techniques-Ohm's law, Kirchhoff's laws - Analysis of simple circuits with DC excitation - Superposition, Thevenin and Norton's theorem - Star and Delta transformation.

UNIT-II: AC CIRCUITS **9**

Representation of sinusoidal waveforms, Peak, RMS and Average value, Real power, Reactive power, Apparent power and Power factor. Analysis of single phase AC circuits consisting of R,L,C,RL,RC, RLC combinations(Series and Parallel) - Resonance in series circuits (Study of phenomenon).Three phase circuits - Relation between voltage and current in star and delta connections-Three phase balanced circuits.

UNIT-III: ELECTRICAL MACHINES AND TRANSFORMERS **9**

Working and construction of Single phase transformer - EMF equation-Equivalent circuit - Regulation and Efficiency. Construction and Principle of operation of: Three phase induction motor and Single phase induction motor-Synchronous generators - Regulation and efficiency - Construction and Operation of DC generator and DC motor - Load test on DC motor and Swinburne's test - DC generator emf equation-Applications of all machines.

UNIT-IV: BASIC ELECTRONIC SYSTEMS **9**

Semiconductor materials-Operation and characteristics of BJT, JFET, MOSFET, UJT and SCR. Amplifier circuits-Operational Amplifiers and its characteristics – Inverting-Non Inverting – Summing-Differential amplifiers. Linear IC applications: Voltage regulators-555 Timer and Phase locked loops.

UNIT-V: ENERGY, POWER ELECTRONICS AND MEASUREMENTS **9**

Three phase Converter and Inverter Circuit Operation - UPS – SMPS-Batteries and Types-Design of battery for backup-Measuring Instruments: Digital voltmeter-Digital Storage Oscilloscope - Energy Consumption Calculation-Power factor improvement-Harmonics and its mitigation methods.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Kothari.D.P, NagrathI.J, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. BimbhraP.S, "Electrical Machinery", Khanna Publishers, 2011.
3. Rashid M H, "Power electronics: circuits, devices, and applications", Pearson Education India, 2009.
4. SedhaR.S,"A Textbook of Applied Electronics", S.Chand and Company Limited, 2016

5. Nagsarkar T .K and SukhijaM. S, "Basic Electrical Engineering", Oxford Press, 2005.
6. NagrathI.J and Kothari D.P, "Electric Machines", McGraw Hill Education, 2010.
7. Hughes E, "Electrical and Electronics Technology" Pearson, 2010.
8. MahmoodNahvi and Joseph A. Edminister, "Electric Circuits", Schaum Outline series, McGraw Hill, Sixth edition, 2014.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Verify Ohm's law, Kirchhoff's laws and theorems for simple electrical circuits.

CO2: Solve problems on AC circuits and analyze three phase AC circuits.

CO3: Understand the performance of AC, DC machines and transformers.

CO4: Studying of analog electronic devices and Operational Amplifier applications.

CO5: Understanding of power electronic circuits and their application.

19CAES007 ENGINEERING GRAPHICS SEMESTER II

L	T	P	C
2	0	4	4

COURSE OBJECTIVES:

- To know the geometrical construction in plane geometry and to draw various curves used in engineering practice
- To know how to draw orthographic projection from a pictorial view of a solid
- To practice the projection of points based on quadrants, line and planes in first quadrant
- To know about solid and its projection and its sectional views on different principle planes
- To know development of various solid surfaces and to draw isometric projection from available principle plane projections

UNIT-I: GEOMETRICAL CONSTRUCTIONS 6+12

Dimensioning - Lettering - Types of Lines - Scaling conventions - Dividing a given straight line in to any number of equal parts - Bisecting a given angle - Drawing a regular polygon given one side - Special methods of constructing a pentagon and hexagon.

UNIT-II: ORTHOGRAPHIC PROJECTIONS 6+12

Introduction to Orthographic projections – Projection of points - Projection of straight lines with traces – conversion of pictorial views to orthographic views - Projection of solids

UNIT-III: SECTION OF SOLIDSAND DEVELOPMENT 6+12

Sectioning of solids - Development of surfaces

UNIT-IV: PICTORIAL VIEW 6+12

Isometric Projections – Conversion of orthographic views to Pictorial views (simple objects)

UNIT-V: COMPUTER AIDED DRAFTING (NOT FOR EXAMINATION) 6+12

Introduction to computer aided drafting package to make 2-D Drawing. Object Construction - page layout – Layer and Line type - Creating, Editing and selecting the Geometric Objects - Mechanics - Viewing, Annotating, Hatching and Dimensioning the drawing - Creating Blocks and Attributes, Drafting - Create 2D drawing. A Number of chosen problems will be solved to illustrate the concepts clearly. (Demonstration purpose only)

Contact Periods:

Lecture: 30 Periods Tutorial: 0 Periods Practical: 60 Periods Total: 90 Periods

REFERENCES:

1. N.S Parthasarathy and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
2. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 50th Edition, 2010.
3. Natrajan K.V., “A text book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2009.
4. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 2008.
5. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
6. Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores,

Bangalore, 2007.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Represent solids as per international standards.

CO2: Generate and interpret multiple views through development, interpretation and sectional views.

CO3: Generate and interpret orthographic views.

CO4: Generate and interpret pictorial views.

CO5: Towards the end of the course it is expected that the students would be matured to visualize the engineering components.

19CSPC205 **PYTHON PROGRAMMING** **SEMESTER II**

L	T	P	C
2	0	2	3

COURSE OBJECTIVES:

- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.
- To understand object-oriented features.

UNIT-I : DATA, EXPRESSIONS, STATEMENTS **9**

Python interpreter and interactive mode; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT-II: CONTROL FLOW, FUNCTIONS **9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT-III: LISTS, TUPLES, DICTIONARIES **9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT-IV: FILES, MODULES, PACKAGES **9**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

UNIT-V: OBJECT ORIENTED FEATURES **9**

Classes Principles of Object Orientation - Creating Classes - Instance Methods - File Organization - Special Methods - Class Variables - Inheritance - Polymorphism - Type Identification - Simple Character Matches - Special Characters - Character Classes - Quantifiers - Dot Character - Greedy Matches - Grouping - Matching at Beginning or End - Match Objects - Substituting - Splitting a String - Compiling Regular Expressions.

Contact periods:

Lecture: 30 Periods **Tutorial: 0 Periods** **Practical: 15 Periods** **Total: 45 Periods**

REFERENCES:

1. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016.

2. Guido van Rossum and Python development team, - An Introduction to Python - Revised and updated for Python 3.6.2, Shroff Publishers and Distributors Pvt. Ltd., 2017.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, - Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
4. Timothy A. Budd, - Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Wesley J Chun, - Core Python Applications Programming, Prentice Hall, 2012.
6. Allen B Downey, - Think Python, O'Reilly, 2012.

COURSE OUTCOMES:

Upon on completion of the course, the student will be able to

CO1: Structure simple Python programs for solving problems.
CO2: Decompose a Python program into functions.
CO3: Represent compound data using Python lists, tuples, dictionaries.
CO4: Read and write data from/to files in Python Programs.
CO5: Design applications using OOP concepts.

19CABS005 **CHEMISTRY LABORATORY** **SEMESTER II**

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric analysis.
- To provide exposure to the students with hands on experience on the determination of chemical substances present in solution by conductometric and potentiometric experiments.
- To quantify the Copper content by Iodometric method.
- To expose the students to test the Saponification value of an oil.
- To equip the students with the principles of rate constant of a chemical reaction.

LIST OF EXPERIMENTS:

1. Estimation of hardness by EDTA method.
2. Estimation of chloride by Argentometric method.
3. Conductometric titration of mixture of acids and strong base.
4. Estimation of iron content of the given solution using Potentiometer.
5. Determination of Saponification value of oil.
6. Estimation of Iron by Spectrophotometry.
7. Estimation of HCl by pH titration.
8. Determination of the rate constant of reaction.
9. Estimation of Dissolved Oxygen by Iodometry.
10. Conductometric titration of strong acid and strong base.
11. Conductometric precipitation titration using $BaCl_2$ and Na_2SO_4.
12. Estimation of copper content of the given solution by Iodometry.

Contact periods:

Lecture: 0 Periods **Tutorial: 0 Periods** **Practical: 45 Periods** **Total: 45 Periods**

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

CO1: Outfit with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

CO2: Apply the EMF and conductometric measurements in quantitative analysis of Substances.

CO3: Equip with the methods and techniques involved in the Saponification process.

CO4: Comprehend the rate constant of a chemical reaction with respect to time.

CO5: Quantify the metal ion concentration of the given sample.

19CSES207 FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY **SEMESTER II**

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

- To familiarize with basic electrical wiring and measurements
- To provide basic laboratory experience on electronic circuits, DC machines, AC machines and transformer
- To demonstrate internal view of machines and other advanced measurement devices

LIST OF EXPERIMENTS:

1. Introductions to measuring instruments-voltmeter, ammeter, wattmeter, multimeter and Digital Storage Oscilloscope.
2. Resonance in RLC circuits, verification of laws in electrical circuits.
3. Measurement of phase difference between voltage and current.
4. Voltage Current relations in three phase circuit and three phase power measurement.
5. Op Amp and its applications in simple circuits.
6. Demonstration of cut out section of machines.
7. No load test on single phase transformer and equivalent test.
8. Load Test on single phase transformer.
9. Swinburne's Test, Speed Control and Load test on DC motor.
10. Direction change and load test on three phase induction motor.
11. Alternator load test and regulation test.
12. Demonstration of Power Quality Analyzer, AC and DC drives.

Contact periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

CO1: Making electrical connections by wires of appropriate wires

CO2: Acquire exposure to common electrical components and measuring instruments

CO3: Verify Simple laws using electrical circuits

CO4: Do experiment to understand the characteristics of transformers and Electrical machines

CO5: Understand the working of Low Tension Switch gear components, AC and DC drives.

19CABS008 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS **SEMESTER III**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis this is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems

UNIT-I: PARTIAL DIFFERENTIAL EQUATIONS **9**

Formation of partial differential equations – Singular integrals – Solutions of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients of homogeneous and non - homogeneous types.

UNIT-II: FOURIER SERIES **9**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval's identity – Harmonic analysis.

UNIT-III: APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **9**

Classification of PDE – Method of separation of variables – Fourier Series solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT-IV: FOURIER TRANSFORMS **9**

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT-V: Z -TRANSFORMS AND DIFFERENCE EQUATIONS **9**

Z-transforms – Elementary properties – Inverse Z-transform (using partial fraction and residues) – Initial and final value theorems – Convolution theorem – Formation of difference equations – Solution of difference equations using Z-transform.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Grewal B. S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.
2. Narayanan S, Manicavachagom Pillay T. K and Ramanaiah G., "Advanced Mathematics for Engineering Students", Vol. II & III, Viswanathan. S Publishers Pvt. Ltd, Chennai, 1998.

3. Andrews L. C and Shivamoggi B, "Integral Transforms for Engineers" SPIE Press, 1999.
4. Bali. N. P and Manish Goyal, "A Textbook of Engineering Mathematics", 9th Edition, Laxmi Publications Pvt. Ltd, 2014.
5. Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.
6. James G., "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Understand how to solve the given standard partial differential equations.

CO2: Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

CO3: Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.

CO4: Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

CO5: Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

19CSES302 DIGITAL PRINCIPLES AND SYSTEM DESIGN SEMESTER III

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To design digital circuits using simplified Boolean functions.
- To design combinational circuits, synchronous and asynchronous sequential circuits.
- To write HDL code for combinational and sequential circuits.
- To know the spread spectrum modulation techniques and different multiple access methods.

UNIT-I: BOOLEAN ALGEBRA AND LOGIC GATES 9

Number systems – Arithmetic operations – Binary codes – Boolean algebra and logic gates – Theorems and properties of boolean algebra – Boolean functions – Canonical and standard forms – Simplification of boolean functions using Karnaugh map – Logic gates – NAND and NOR implementations

UNIT-II: COMBINATIONAL LOGIC 9

Combinational circuits – Analysis and design procedures – Binary adder – Subtractor – Decimal adder – Binary multiplier – Magnitude comparator – Decoders – Encoders – Multiplexers – Introduction to HDL – HDL models of combinational circuits.

UNIT-III: SYNCHRONOUS SEQUENTIAL LOGIC 9

Sequential circuits – Storage elements: latches, flip-flops – Analysis of clocked sequential circuits – State reduction and assignment – Design procedure – Registers and counters – HDL models of sequential circuits.

UNIT-IV: ASYNCHRONOUS SEQUENTIAL LOGIC 9

Analysis and design of asynchronous sequential circuits – Reduction of state and flow tables – Race-free state assignment – Hazards.

UNIT-V: MEMORY AND PROGRAMMABLE LOGIC 9

RAM – Memory decoding – Error detection and correction – ROM – Programmable logic Array – Programmable array logic – Sequential programmable devices.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Morris. M, Mano. R and Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL and System Verilog", 6th Edition, Pearson Education, 2017.
2. Kharate G. K., "Digital Electronics", Oxford University Press, 2010
3. John F. Wakerly, "Digital Design Principles and Practices", 5th Edition, Pearson Education, 2017.
4. Charles H. Roth Jr and Larry L. Kinney, "Fundamentals of Logic Design", 6th Edition,Cengage Learning, 2013
5. Donald D. Givone, "Digital Principles and Design", Tata Mc Graw Hill, 2003.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Simplify Boolean functions using K Map.
CO2: Design and Analyze Combinational and Sequential Circuits.
CO3: Implement designs using Programmable Logic Devices.
CO4: Write HDL code for combinational and Sequential Circuits.

19CSPC303 **DATA STRUCTURES** **SEMESTER III**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To Implement List, Stack and Queue Abstract Data Types.
- To implement Tree and graph.
- To Implement Shortest Path Algorithm and Minimum Spanning Tree Algorithms.
- To Understand Various internal and external sorting
- To understand the hashing Techniques.

UNIT-I: INTRODUCTION AND LINEAR DATA STRUCTURE 9

Algorithm analysis: Calculation of running time, Introduction to Abstract Data Types (ADT) – List ADT – Array-based implementation – Linked list implementation – Cursor-based linked lists – Doubly-linked lists – Applications of lists.

UNIT-II: STACK AND QUEUE 9

Stack ADT: Stack model, Implementation of stacks, Applications: Balancing symbols, Postfix expression evaluation, Infix to postfix conversion, Function Calls – Queue ADT: Queue Model, Implementation of Queues, Applications.

UNIT-III: TREES 9

Tree ADT – Tree traversals – Left child right sibling data structures for general trees – Binary Tree ADT – Expression trees – Applications of trees – Binary search tree ADT – Threaded Binary Trees. AVL trees – Splay trees – B-Tree - Heaps – Binary heaps – Applications of binary heaps.

UNIT-IV: GRAPH ALGORITHMS 9

Definitions – Representation of Graphs – Traversal – Topological sort – Shortest path algorithms: Dijkstra's algorithm – Network flow problem – Minimum spanning tree: Prim's and Kruskal's algorithm.

UNIT-V: SORTING AND HASHING 9

Insertion sort – Shell sort – Heap sort – Merge sort – Quick sort – Bucket sort – External sorting: Simple algorithm, Multi way merge, Poly phase merge. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C" 2nd Edition, Pearson Education Limited, 2002.
2. Thomas H. Cormen , Charles E. Leiseron and Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, PHI learning Pvt. Ltd., 2011.
3. Sartaj Sahni, "Data Structures, Algorithms and applications in C++", 2nd Edition, Universities Press, 2005.
4. Aho A.V, Hopcroft J. E and Ullman J.D., "Data Structures and Algorithms", 1st Edition, Reprint, Pearson Education, 2003.
5. Gilberg R. F and Forouzan B. A., "Data Structures", Second Edition, Thomson India.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Analyze the time complexity of various algorithms.
CO2: Define and use list, stack and queue Abstract Data Types.
CO3: Define and use Tree ADT.
CO4: Explain Tree and Graph Traversals.
CO5: Use suitable sorting and hashing technique.

19CSPC304	COMPUTER ORGANIZATION AND ARCHITECTURE	SEMESTER III			
		L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make students understand the basic structure and operation of digital computer.
- To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- To expose the students to the concept of pipelining, parallelism and multi-core processors.
- To understand the memory hierarchies, cache memories and virtual memories.
- To learn the different ways of communication with I/O devices.

UNIT-I: BASIC STRUCTURE OF COMPUTERS 9

Functional units, Basic operational concepts, Performance, Instructions, Operations and Operands, representing instructions, Logical operations, Control operations, MIPS addressing, RISC, CISC.

UNIT-II: ARITHMETIC FOR COMPUTERS 9

ALU, Addition and Subtraction, Multiplication, Division, Floating point representation, Floating point operations, Sub word parallelism.

UNIT-III: PROCESSOR AND CONTROL UNIT 9

Basic MIPS implementation, Hardwired control, Micro programmed control, Pipelining, Pipelined data path and control, Handling Data Hazards & Control Hazards – Exception Handling.

UNIT-IV: PARALLELISIM 9

Parallel processing challenges, Flynn‘s classification – SISD, MIMD, SIMD, SPMD, Vector architectures, Hardware multithreading, Multi-core processors, Introduction to Graphics Processing units, Clusters, Warehouse scale computers.

UNIT-V: MEMORY AND I/O SYSTEMS 9

Memory hierarchy, Memory technologies, Cache basics, Measuring and improving cache performance, Virtual memory, TLBs, Input/output system, programmed I/O, DMA and interrupts, I/O processors.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, 5th Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer Organization and Embedded Systems”, 6th Edition, Tata McGraw Hill, 2012.
3. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 8th Edition, Pearson Education, 2010.
4. John P. Hayes, “Computer Architecture and Organization”, 3rd Edition, Tata McGraw Hill, 2012.
5. John L. Hennessey and David A. Patterson, “Computer Architecture – A Quantitative Approach”, 5th Edition, Morgan Kaufmann / Elsevier Publishers, 2012.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Design arithmetic and logic unit.
CO2: Design and analyze pipelined control units.
CO3: Understand parallel processing architectures.
CO4: Evaluate performance of memory systems.
CO5: Understand parallel processing architectures.

19CSPC305 OBJECT ORIENTED PROGRAMMING SEMESTER III

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics of Java.
- To know the principles of inheritance and interfaces and string handling operations.
- To define multithreading and use of exception handling.
- To Understand I/O streams and use of collection frame work.
- To design and build simple Graphical User Interfaces.

UNIT-I: OOP FUNDAMENTALS AND BASICS OF JAVA PROGRAMMING 9

OOP Concepts – Classes and Objects – Abstraction – Encapsulation – Inheritance – Polymorphism – OOP fundamentals implementation – Instance variables – Methods – Access specifiers – Coding standards– Identifiers – Variables– Data types – Operators– Control structures– Java architecture– Methods – Pass by value and Pass by reference – Recursive methods – Arrays – Package – Accessing sub-package and classes.

UNIT-II: INHERITANCE AND INTERFACE 9

Constructor – Types of constructor – Static keyword and its use – Final keyword and its use – Inheritance – Types of Inheritance – Polymorphism – Static polymorphism and dynamic polymorphism – Abstract keyword – Abstract class – Interface – Extending the interface – Implementation of interface – Difference between abstract class and interface. String: String Methods – String buffer class – String builder class – String tokenizer class.

UNIT-III: MULTITHREADING AND EXCEPTION HANDLING 9

Introduction to multi – Threading – Thread life cycle – Implementation of multithreading – Thread synchronization – Inter thread communication – Introduction to exception handling – Types of exception – Try and catch – Multiple catch block and nested try block – Finally block.

UNIT-IV: FILE HANDLING AND COLLECTION FRAMEWORK 9

Input / output basics – Streams – Byte streams and character streams – Reading and writing console – Reading and writing files. Collection interfaces – Collection classes.

UNIT-V: EVENT DRIVEN PROGRAMMING 9

Graphics programming – Frame – Components –Working with 2D shapes – Using color, fonts, and images – Basics of event handling – Event handlers – Adapter classes – Actions – Mouse events – AWT event hierarchy – Introduction to Swing – Layout management – Swing Components – Text Fields, Text Areas – Buttons– Check boxes – Radio buttons – Lists– choices– Scrollbars – Windows – Menus – Dialog Boxes

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Herbert Schildt, “Java The complete reference”, 8th Edition, McGraw Hill Education, 2011.
2. Cay S. Horstmann and Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.

3. Paul Deitel and Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.
4. Steven Holzner, “Java 2 Black book”, Dreamtech press, 2011.
5. Timothy Budd, “Understanding Object–oriented programming with Java”, Updated Edition, Pearson Education, 2000.

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Develop Java programs using OOP principles.
CO2: Develop Java programs with the concepts of inheritance and interfaces.
CO3: Build Java applications using exceptions and multithreading.
CO4: Develop Java applications with I/O streams and collection frame work.
CO5: Develop GUI based Java programs using swings.

19CAHS002	ENVIRONMENTAL SCIENCE AND ENGINEERING	SEMESTER III			
		L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand what constitutes the environment.
- To conserve the natural resources.
- To learn and understand the role of a human being in maintaining a clean and useful environment for the future generations.
- To acquire knowledge about ecological balance and preservation of biodiversity.
- To get an idea about the role of government and non-government organization in environment management.

UNIT-I: ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – Need for public awareness – Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – Biogeographical classification of India – Value of biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and Option values – Biodiversity at global, National and local levels – India as a mega – Diversity nation – Hot-spots of biodiversity – Threats to biodiversity: Habitat loss, Poaching of wildlife, Man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, Insects, Birds; Field study of simple ecosystems – Pond, River, Hill slopes, etc.

UNIT-II: ENVIRONMENTAL POLLUTION 8

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste management: Causes, Effects and Control measures of municipal solid wastes – Role of an individual in prevention of pollution –Pollution case studies –Disaster management: Floods, Earthquake, Cyclone and Landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT-III: NATURAL RESOURCES 10

Forest resources: Use and over – Exploitation, Deforestation, Case studies –Timber extraction, mining, Dams and their effects on forests and tribal people – Water resources: Use and over – Utilization of surface and ground water, Floods, Drought, Conflicts over water, dams – Benefits and problems – Mineral resources: Use and exploitation, Environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, Changes caused by agriculture and overgrazing, Effects of modern agriculture, Fertilizer–pesticide problems, Water logging, Salinity, Case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, Use of alternate energy sources. Case studies – Land resources: Land as a resource, Land degradation, Man induced landslides, Soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – River / Forest / Grassland / Hill / Mountain.

UNIT-IV: SOCIAL ISSUES AND THE ENVIRONMENT **7**

From unsustainable to sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, Watershed management – Resettlement and rehabilitation of people; Its problems and concerns, Case studies – Role of non-governmental organization –Environmental ethics: Issues and possible solutions – Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and holocaust, Case studies. – wasteland reclamation – Consumerism and waste products – Environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act– Forest conservation act – Enforcement machinery involved in environmental legislation – Central and state pollution control boards – Public awareness.

UNIT-V: HUMAN POPULATION AND THE ENVIRONMENT **6**

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health – Case studies.

Contact Periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2004.
3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India Pvt. Ltd., New Delhi, 2007.
4. Erach Bharucha, "Textbook of Environmental Studies", Universities Press (I) Pvt. Ltd., Hydrabad, 2015.
5. Rajagopalan R., "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.
6. Tyler. G Miller and Scott E. Spoolman, Environmental Science, Cengage Learning India PVT, LTD, Delhi, 2014.

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Understand how to conserve the natural resources.
CO2: Understand what constitutes the environment and how to conserve biodiversity.
CO3: Create awareness about environmental pollution and disaster management.
CO4: Gain adequate knowledge about the social issues of the environment and the role of government and non government organization in environment management.
CO5: Understand about human population and the environment and the role of information technology in environment and human health.

19CSPC307 DATA STRUCTURES LABORATORY SEMESTER III

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

- To implement the linear data structures.
- To implement the Nonlinear data structures.
- To implement the sorting and hashing techniques.

LIST OF EXPERIMENTS:

1. Stack Operations in array and Linked List Implementation
2. Queue operations in array and Linked List Implementation
3. Application of stacks: Recursion, Infix to postfix conversion
4. Application of Queue: Simulation of FCFS and Round Robin Scheduling
5. Linked list: Circularly linked list, doubly linked list
6. Application of Linked List: Polynomial Manipulations
7. Trees: Operations on binary tree and binary search tree
8. Implementation of AVL Tree
9. Implementation of Tree and Graph Traversal Algorithms
10. Implementation of Minimum Spanning Algorithms
11. Implementation of hashing techniques
12. Implementation of sorting techniques

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Implement linear data structures using arrays and Linked Lists.

CO2: Implement Nonlinear data structures.

CO3: Implement various sorting and hashing Techniques.

LIST OF EQUIPMENT'S AND COMPONENTS

- Software Required – TURBOC version 3 or GCC version 3.3.4.
- Operating System – WINDOWS 2000 / XP / NT OR LINUX
- Computers Required – 30 Nos. (Minimum Requirement: Pentium III or Pentium IV with 256 RAM and 40 GB hard disk)

19CSPC308	OBJECT ORIENTED PROGRAMMING LABORATORY	SEMESTER III			
		L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, array list, 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.
2. Develop a Java Application to implement currency convertor, distance convertor and time convertor
3. Design and develop an java application for the Employee Payroll system using inheritance
4. Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations
5. Implement 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
6. Implement a java program to accept integer or string values from the user within a specified range. (Range has to be specified with minimum and maximum by the user). If the input violates the range, appropriate exception needs to be raised
7. Implement 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
8. Design and implement an application that executes two threads. First thread displays the alphabets A to Z at every one second. The Second thread will display the alphabets Z to A at every two seconds. Both the threads need to synchronize with each other for printing alphabets. The Second thread has to wait until the first thread finishes its execution. The application waits for all the threads to finish the execution
9. Implement a program to design an application for banking operation (deposit and withdrawal) using files
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
12. Develop a mini project for any application using Java concepts

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.

CO2: Implement Java programs with array list, exception handling and multithreading.

CO3: Design applications using file processing, generic programming and event handling.

LIST OF EQUIPMENT'S AND COMPONENTS

- Software Required – Net Beans OR Eclipse IDE with JDK.
- Operating System – WINDOWS 2000 / XP / NT OR LINUX.
- Computers Required – 30 Nos. (Minimum Requirement: Pentium III or Pentium IV with 256 RAM and 40 GB hard disk).

19CSES309 DIGITAL SYSTEMS LABORATORY SEMESTER III

L	T	P	C
0	0	3	1.5

COURSE 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:

Verification of Boolean Theorems using basic gates

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

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Implement simplified combinational circuits using basic logic gates.
CO2: Implement combinational circuits using MSI devices.
CO3: Implement sequential circuits like registers and counters.

LIST OF EQUIPMENT'S AND COMPONENTS

- Digital trainer kits – 30 nos.
- Digital ICs required for the experiments in sufficient numbers
- Software**:** HDL simulator.

19CSBS401 DISCRETE MATHEMATICS SEMESTER IV

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To extend students 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 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 9

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

UNIT-II: COMBINATORICS 9

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 9

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 9

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 9

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

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

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

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Have knowledge of the concepts needed to test the logic of a program.

CO2: Have Knowledge in identifying structures on many levels.

CO3: Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.

CO4: Be aware of the counting principles.

CO5: Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

19CSPC402 **OPERATING SYSTEMS** **SEMESTER IV**

L	T	P	C
3	0	0	3

COURSE 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.

Contact Periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Abraham Silberschatz, "Peter Baer Galvin and Greg Gagne", "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.
2. Ramaz Elmasri, A. Gil Carrick and David Levine, Operating Systems – A Spiral Approach Tata McGraw Hill Edition, 2010.
3. Achyut S.Godbole and Atul Kahate, "Operating Systems", McGraw Hill Education, 2016.
4. Andrew S. Tanenbaum, "Modern Operating Systems", 2nd Edition, Pearson Education, 2004.
5. Gary Nutt, "Operating Systems", 3rd Edition, Pearson Education, 2004.
6. Harvey M. Deitel, "Operating Systems", 3rd Edition, Pearson Education, 2004.
7. Daniel P. Bovet and Marco Cesati, "Understanding the Linux kernel", 3rd Edition, 'Reilly, 2005.
8. Neil Smyth, "iPhone iOS 4 Development Essentials – Xcode", 4th Edition, Payload media, 2011.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Analyze various scheduling algorithms.
CO2: Understand deadlock, prevention and avoidance algorithms.
CO3: Compare and contrast various memory management schemes.
CO4: Understand the functionality of file systems.
CO5: Understand and characterize phenomenon of Linux Operating System.

19CSPC403 DATABASE MANAGEMENT SYSTEM SEMESTER IV

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To expose the students to the fundamentals of Database Management Systems and SQL.
- To make clear the students with ER diagrams.
- To understand the essential concepts of transaction processing, concurrency control and recovery procedures.
- To comprehend the internal storage structures using different file and indexing techniques.
- To have an introductory knowledge about the distributed and object oriented database.

UNIT-I: INTRODUCTION TO DBMS 9

Purpose of database system – Views of data – Data models – Database languages – Database system architecture – Introduction to relational databases – Keys – Relational algebra Operations – SQL Fundamentals – Integrity – Advanced SQL Features – Embedded SQL – Dynamic SQL

UNIT-II: DATABASE DESIGN 9

Entity Relationship model – ER Diagrams – Enhanced ER model – ER to Relational mapping – Normalization – Functional dependencies – Decomposition – First, Second, Third Normal Forms – Boyce Codd normal form – Multivalued dependencies and Fourth normal form – Join dependencies and Fifth normal form

UNIT-III: TRANSACTION PROCESSING AND CONCURRENCY CONTROL 9

Transaction concepts – ACID Properties – Transaction recovery – System recovery – Media recovery – Save points – Isolation levels – Serializability – Concurrency control – Need for concurrency – Locking protocols – Two phase locking – Dead Lock – SQL Facilities for concurrency and recovery

UNIT-IV: IMPLEMENTATION TECHNIQUES 9

Overview of physical storage media – Magnetic disks – RAID – Tertiary storage – 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 – Catalog information for cost estimation – Selection operation – Sorting – Join operation

UNIT-V: ADVANCED TOPICS 9

Introduction to 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

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Abraham Silberschatz, Henry F. Korth and Sudharshan S., - Database System Concepts, Sixth Edition, Tata McGraw Hill, 2011.
2. RamezElmasri and Shamkant B. Navathe, - Fundamentals of Database Systems, Sixth

Edition, Pearson Education, 2011.
3. Raghu Ramakrishnan, - "Database Management Systems", 4th Edition, McGraw-Hill College Publications, 2015.
4. Date C. J, Kannan A and Swamynathan S, - "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.
5. Gupta G.K., "Database Management Systems", Tata Mc Graw Hill, 2011.
6. Singh S. K., "Database Systems Concepts, Design and Applications", 1st Edition, Pearson Education, 2006.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Design Databases for applications.
CO2: Map ER model to Relational model to make database design.
CO3: Apply concurrency control and recovery mechanisms for real-world problems.
CO4: Compare the several indexing strategies in different database systems.
CO5: Learn advanced database concepts and assess how it differ from traditional databases.

19CSPC404 DESIGN AND ANALYSIS OF ALGORITHMS SEMESTER IV

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To learn and analyze critical algorithmic solutions for the same problem.
- To know different algorithm design techniques.
- To understand the limitations of Algorithmic power.

UNIT-I: INTRODUCTION 9

Importance – Role of algorithms in computing– Fundamentals of the analysis of algorithmic efficiency – Analysis framework asymptotic notations and properties –Mathematical analysis for recursive and non-recursive algorithms – Empirical analysis –Algorithm visualization

UNIT-II: BRUTE FORCE, DIVIDE AND CONQUER METHODOLOGY 9

Brute force methodology – Finding maximum and minimum element – String matching – convex-hull problems – Sequential search and string matching – Depth first search and Breadth first search, Assignment problem. Divide and Conquer methodology – Merge sort – Quick sort – Heap sort – Binary tree traversals multiplication of large integers and Strassen's matrix multiplication – Closest-pair and Convex-hull problems.

UNIT-III: DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 9

Dynamic programming – Warshall's and Floyd's algorithm –Principle of optimality – All Pairs Shortest Path – Coin Changing problem– Multi stage graph – Memory functions and Optimal binary search trees – Knapsack problem. Greedy Method – Optimal Merge pattern – Huffman trees – Prim's algorithm – Kruskal's algorithm.

UNIT-IV: BACKTRACKING AND ITERATIVE IMPROVEMENT 9

Backtracking: n – Queens problem – Hamiltonian Circuit problem – Subset Sum problem. The Simplex method – The Maximum-Flow Problem – Maximum matching in Bipartite graphs.

UNIT-V: COPING WITH THE LIMITATIONS OF ALGORITHM POWER 9

Lower – Bound arguments – P, NP, NP-Complete and NP Hard Problems. Branch and Bound – LIFO search and FIFO search – Assignment problem – Knapsack problem – Travelling Salesman problem – Approximation algorithms for NP-Hard Problems

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2012.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007.
3. Horowitz S. Sahni and S. Rajasekaran, "Computer Algorithms," 2nd Edition, Galgotia, Publications, 2008.
4. Jon Kleinberg and Eva Tardos, "Algorithm Design", Pearson Education, 2006.
5. Jeffrey J McConnell, "Analysis of Algorithms", Jones and Bartlett Publishers, 2008.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Explain the algorithms for different computing problem frameworks.
CO2: Analyze brute force and divide and conquer methods for various problems.
CO3: Utilize dynamic programming and greedy technique for problem solving.
CO4: Interpret the role of backtracking.
CO5: Critically analyze the P and NP problems with the help of branch and bound.

19CSES405 MICROPROCESSOR AND MICROCONTROLLER SEMESTER IV

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

8086Signals – Basic configurations – System bus timing –Systemdesignusing8086 –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 8051timers – Serial port programming – Interrupts programming – LCD & Keyboard interfacing – ADC, DAC & Sensor Interfacing – External memory interface – Stepper Motor and Waveform generation –Comparison of microprocessor, Microcontroller, PIC and ARM Processor.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

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

TMH, 2012.
4. Ray A. K and Bhurchandi K.M., "Advanced Microprocessors and Peripherals", 3rd Edition, Tata McGrawHill, 2012.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Understand and execute programs based on 8086 microprocessor.
CO2: Design Memory Interfacing circuits.
CO3: Design and interface I/O circuits.
CO4: Understand and execute programs based on 8051microcontroller.
CO5: Design and implement 8051 microcontroller based systems.

19CSMC406 CONSTITUTION OF INDIA SEMESTER IV

L	T	P	C
3	0	0	0

COURSE OBJECTIVES:

- To teach history and philosophy of Indian Constitution.
- To describe the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To summarize powers and functions of Indian government.
- To explain emergency rule.
- To explain structure and functions of local administration.

UNIT-I: INTRODUCTION 9

History of making of the Indian constitution – Drafting committee – Composition & working – Philosophy of the Indian constitution – Preamble – Salient features.

UNIT-II: CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES 9

Fundamental rights – Right to equality – Right to freedom – Right against exploitation right to freedom of religion – Cultural and educational rights – Right to constitutional remedies directive principles of state policy – Fundamental duties.

UNIT-III: ORGANS OF GOVERNANCE 9

Parliament – Composition – Qualifications and disqualifications– Powers and functions – Executive President – Governor – Council of Ministers – Judiciary, Appointment and transfer of judges, Qualifications powers and functions.

UNIT-IV: EMERGENCY PROVISIONS 9

Emergency provisions – National emergency, President rule, Financial emergency.

UNIT-V: LOCAL ADMINISTRATION 9

District's Administration head – Role and importance – Municipalities – Introduction – Mayor and role of elected representative – CEO of municipal corporation – Panchayat Raj – Introduction – PRI – Zila Panchayat – Elected officials and their roles – CEO Zila Panchayat Position and role – Block level – Organizational hierarchy (Different departments) – Village level – Role of elected and appointed officials – Importance of Grass Root Democracy.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Basu D.D., "Introduction to the Constitution of India", Lexis Nexis, 2015.
2. Busi S. N., "Ambedkar B R Framing of Indian Constitution", 1st Edition, 2015.
3. Jain M. P., "Indian Constitution Law", 7th Edition, Lexis Nexis, 2014.
4. The Constitution of India (Bare Act), Government Publication, 1950.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Understand history and philosophy of Indian Constitution.

CO2: Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.

CO3: Understand powers and functions of Indian government.
CO4: Understand emergency rule.
CO5: Understand structure and functions of local administration.

19CSPC407 OPERATING SYSTEMS LABORATORY SEMESTER IV

L	T	P	C
0	0	3	1.5

COURSE 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 system fork, 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
    i. First Fit ii. Worst Fit iii. Best Fit
12. Implementation of Paging Technique of Memory Management
13. Implementation of the following Page Replacement Algorithms FIFO, LRU, LFU
14. Implementation of the various File Organization Techniques
15. Implementation of the following File Allocation Strategies
    i. Sequential ii. Indexed iii. Linked

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Compare the performance of various CPU Scheduling Algorithms.

CO2: Implement Deadlock avoidance and Detection Algorithms.

CO3: Implement Semaphores and Create processes and implement IPC.

CO4: Analyze the performance of the various Page Replacement Algorithms.

CO5: Implement File Organization and File Allocation Strategies.

LIST OF EQUIPMENT'S AND COMPONENTS

- Standalone desktops with C /C++ /Java/Equivalent complier
  (or)
  Server with C /C++ /Java /Equivalent complier supporting

19CSPC408	DATABASE MANAGEMENT SYSTEMS LABORATORY	SEMESTER IV			
		L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVES:

- To learn data definition and data manipulation commands.
- To be familiar with query language.
- To comprehend function, triggers and procedures.
- To learn the use of front end tool.
- To be exposed to implementation of 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. Creation of Views, Sequences, Synonyms
4. High level programming language extensions (Control structures, Procedures and Functions).
5. Database Programming: Implicit and Explicit Cursors
6. Creation of database triggers
7. Exception Handling
8. Forms
9. Database Connectivity with Front End Tools
10. Mini project (Any one Application Development using Oracle/ Mysql)
    i. Inventory Control System.
    ii. Material Requirement Processing.
    iii. Hospital Management System.
    iv. Railway Reservation System.
    v. Personal Information System.
    vi. Web Based User Identification System.
    vii. Timetable Management System.
    viii. Hotel Management System

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Use typical data definitions and manipulation commands

CO2: Design applications to test Nested and Join Queries

CO3: Create and maintain tables using PL/SQL.

CO4: Prepare reports.

CO5: Implement applications that require a Front-end Tool

LIST OF EQUIPMENT'S AND COMPONENTS

Software:

Front end: VB/VC ++/JAVA or Equivalent

Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent

19CSES409 MICROPROCESSOR AND MICROCONTROLLER LABORATORY

SEMESTER IV			
L	**T**	**P**	**C**
0	**0**	**3**	**1.5**

COURSE OBJECTIVES:

- To introduce ALP concepts, features and Programs.
- To write ALP for arithmetic and logical operations in 8086 and 8051.
- To differentiate Serial and Parallel Interface.
- To interface different I/O with Microprocessors.
- To be familiar with MASM and exposed to implementation of database applications.

LIST OF EXPERIMENTS:

8086 Programs using kits and MASM

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Code conversion, decimal arithmetic and Matrix operations
4. Floating point operations, string manipulations, sorting and searching
5. Password checking, Print RAM size and system date
6. Counters and Time Delay

Peripherals and Interfacing Experiments

7. Traffic light controller
8. Stepper motor control
9. Digital clock
10. Keyboard and Display
11. Printer status
12. Serial interface and Parallel interface
13. A/D and D/A interface and Waveform Generation

8051 Experiments using kits and MASM

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

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Write ALP Programs for fixed and Floating Point and Arithmetic operations.
CO2: Interface different I/O switch processor.
CO3: Generate waveforms using Microprocessors.
CO4: Execute Programs in 8051.
CO5: Explain the difference between simulator and Emulator

LIST OF EQUIPMENT'S AND COMPONENTS

- Hardware**:**
  8086 development kits - 30 nos, Interfacing Units - Each 10 nos, Microcontroller - 30 nos
- Software**:**
  Intel Desktop Systems with MASM –30 nos
  8086 Assembler, 8051 Cross Assembler

19CSBS501 PROBABILITY AND QUEUEING THEORY SEMESTER V

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- To provide necessary basic concepts in probability and random processes for applications in computer science and 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.

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 reneging.

UNIT-V: ADVANCED QUEUEING MODELS 12

Finite source models – M/G/1 queue – Pollaczek Khinchin formula – M/D/1 and M/EK/1 as special cases – Series queues – Open Jackson networks.

Contact Periods:

Lecture: 45 Periods Tutorial: 15 Periods Practical: 0 Periods Total: 60 Periods

REFERENCES:

1. Gross D, Shortle J.F, Thompson J.M and Harris C.M., “Fundamentals of Queueing Theory”, Wiley Student 4th Edition, 2014.
2. Ibe O.C., “Fundamentals of Applied Probability and Random Processes”, Elsevier, 1st Indian Reprint, 2007.
3. Hwei Hsu, "Schaum‘s Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2004.
4. Taha H.A., "Operations Research", 9th Edition, Pearson India Education Services, Delhi, 2016.
5. Trivedi K.S., "Probability and Statistics with Reliability, Queueing and Computer

Science Applications", 2nd Edition, John Wiley and Sons, 2002.
6. Yates R.D and Goodman D.J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Comprehend the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.

CO2: Know the basic concepts of one and two dimensional random variables and apply in engineering applications.

CO3: Apply the concept of random processes in engineering disciplines.

CO4: Acquire skills in analyzing queueing models.

CO5: Identify the characterize phenomenon which evolve with respect to time in a probabilistic manner.

19CSPC502 **WEB PROGRAMMING** **SEMESTER V**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To acquire knowledge in hypertext markup language and cascading style sheet.
- To understand client-side programming using Java script.
- To understand server-side programming using Servlet, JSP and PHP.
- To acquire knowledge in XML and Ajax enabled Internet application design.
- To understand server-side development.

UNIT-I: INTRODUCTION TO WEBSITES , HTML 5 AND CSS 3 **9**

Introduction to Internet – Websites and Web servers – Internet and Intranet – Web 1.0 vs Web 2.0 vs Web 3.0 – HTML 5: Basic HTML elements, Input and page structure elements, Positioning elements, Backgrounds, Element dimensions, Box model and Text flow, Media types and queries, Shadows, Gradients, animations, Transitions and transformations, Web font, Multi column layout – Cascading style sheet 3: Inline, Internal and external CSS.

UNIT-II: CLIENT SIDE SCRIPTING **9**

Java script: Programming basics – Introduction to scripting, Control statement, Functions, Objects, Event handling, Regular expressions, Exception handling, Validation – Built in objects: Math, String, Date, Arrays, Boolean, Document objects – Document object model.

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 – An introduction to PHP**:** PHP – Using PHP – Variables – Program control – Built-in functions – Connecting to database – Using cookies – Regular expressions.

UNIT-IV: XML, JSON & AJAX ENABLED RICH INTERNET APPLICATIONS **9**

XML: Basics, Structuring data, XML name spaces, DTDs – Schema documents, Extensible style sheet language and XSL transformation, DOM – Web application development: Traditional Vs Ajax web application development, RIA with Ajax, XML HTTP request object, Using XML and DOM, Application creation. Introduction to JSON.

UNIT-V: SERVER-SIDE DEVELOPMENT WITH JSF AND JAVA **9**

Java server faces: Application development, Model view controller architecture, JSF components, Validation, Session tracking, Accessing databases in web apps, Web services: SOAP, REST, JSON, Publishing and consuming SOAP based web services, REST based XML Web services and REST based JSON Web service.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Paul Deitel, Harvey Deitel, Abbey Deitel "Internet and World Wide Web- How to Program", 5th Edition, Pearson, 2012.

2. Achyut Godbole and Atul Kahate, “Web Technologies: TCP/IP to Internet Application Architectures”, Tata McGraw-Hill Education, 2002.
3. Jon Duckett, “Beginning Web Programming with HTML, XHTML and CSS”, Wrox Press, 2004.
4. Nicholas C. Zakas, “Professional Java script for Web Developers”, 3rd Edition, Wrox Press, 2011.
5. Gopalan N.P and Akilandeswari J., “Web Technology”, Prentice Hall of India, 2011.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Develop websites using Hypertext markup language and cascading style sheet.
CO2: Design client-side programming using Java script.
CO3: Write server-side programming using Servlet, JSP and PHP.
CO4: Acquire knowledge in XML and Ajax enabled Internet application design.
CO5: Create server-side application using JSF and Java.

19CSPC503 COMPUTER NETWORKS SEMESTER V

L	T	P	C
3	0	0	3

COURSE 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

World Wide Web and hypertext transfer protocol – File transfer protocol – Email – MIME – Telnet –Secure shell – Domain name system – Simple network management protocol.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Behrouz A. Forouzan, “Data Communications and Networking”, 5th Edition TMH, 2013.
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, 5th Edition, Morgan Kaufmann Publishers Inc., 2012.
3. William Stallings, “Data and Computer Communications”, 10th Edition, Pearson Education, 2013.
4. Nader F. Mir, “Computer and Communication Networks”, 2nd Edition, Prentice Hall, 2014.
5. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill Publisher, 2011.
6. James F. Kurose, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet”, 6th Edition, Pearson Education, 2013.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Gain the knowledge of basic layers and its functions in computer networks.
CO2: Evaluate the performance of a network.
CO3: Discovered the basics of how data flows from one node to another.
CO4: Design protocols for various functions in the network.
CO5: Develop real world applications using various application layer protocols.

19CSPC504 THEORY OF COMPUTATION SEMESTER V

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand basic notations and to construct automata for any given pattern.
- To find equivalent regular expressions for Finite automata.
- To design a context free grammar for any given language and normalize it.
- To construct PDA for any context free language and find equivalence.
- To understand Turing machines and undecidable problems.

UNIT-I: FINITE AUTOMATA 9

Introduction – Basic mathematical notation and techniques – Introduction to formal proof – Additional forms of proof – Inductive proofs – Basic definitions – Finite automaton – DFA – NDFA Finite automata with epsilon transitions.

UNIT-II: REGULAR LANGUAGES 9

Regular languages – Regular expression – Equivalence of NFA and DFA – Equivalence of NDFA with and without epsilon transitions – Equivalence of finite automaton and regular expressions – Equivalence and minimization of automata – Closure properties of regular languages – Pumping lemma for regular sets.

UNIT-III: GRAMMAR 9

Grammar introduction – Types of grammar – Context free grammars and languages – Parse trees ambiguity in grammars and languages – Simplification of CFG: Elimination of useless symbols – Unit productions – Null productions – Chomsky normal form – Greiback normal form.

UNIT-IV: PUSHDOWN AUTOMATA 9

Pushdown automata – Definitions – Instantaneous descriptions – Languages of a pushdown automata – Deterministic pushdown automata – Equivalence of pushdown automata and CFG – Pumping lemma for CFL – Closure properties of CFL.

UNIT-V: TURING MACHINES 9

Definitions of turing machines – Programming techniques for TM – Multi head and multi tape turing machines – Universal Turing machine – The Halting problem – Partial solvability – Recursive and recursively enumerable languages – Undecidable problems about TM.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Hopcroft J.E, Motwani R and Ullman J.D., "Introduction to Automata Theory, Languages and Computations", 3rd Edition, Pearson Education, 2008 (UNIT 1, 2, 3).
2. John C. Martin, "Introduction to Languages and the Theory of Computation", 3rd Edition, Tata McGraw Hill Publishing Company, New Delhi, 2007 (UNIT 4, 5).
3. Mishra K L P and Chandrasekaran N., "Theory of Computer Science - Automata, Languages and Computation", 3rd Edition, Prentice Hall of India, 2004.
4. Harry R. Lewis and Christos H. Papadimitriou, "Elements of the Theory of Computation", 2nd Edition, Prentice Hall of India, Pearson Education, New Delhi, 2003.

5. Peter Linz, "An Introduction to Formal Language and Automata", 3rd Edition, Narosa Publishers, New Delhi, 2002.
6. Kamala Krithivasan and Rama R., "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education 2009.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Construct DFA, NFA and NFA with Epsilon transition for regular languages.
CO2: Find Equivalence of Regular expression and finite automata and also minimize it.
CO3: Write Context free grammar for any construct and normalize it.
CO4: Design PDA for any CFL and find equivalence of PDA and CFG.
CO5: Construct Turing machines and halting problem.

19CSPC505 WEB PROGRAMMING LABORATORY SEMESTER V

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

- To be familiar with Web page design using HTML/XML and style sheets.
- To learn to create dynamic web pages using client side scripting.
- To learn and write Client Server applications.
- To be familiar with the PHP programming.
- To be exposed to creating applications with AJAX.

LIST OF EXPERIMENTS:

1. Designing static web pages using HTML
2. Designing dynamic web pages using different cascading style sheets
3. Programs using Java Script
4. Programs using Java servlets
5. Programs using JSP
6. Designing web applications using PHP
7. Designing XML Schemas
8. Programs using JSON and Ajax
9. Designing web applications in Net Beans Environment
10. Database Connectivity with MySQL using Java Servlets, JSP, and PHP

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Construct web pages using HTML/XML and style sheets.

CO2: Design dynamic web pages with validation using Java script objects and by applying different event handling mechanisms.

CO3: Develop dynamic web pages using server side scripting.

CO4: Apply PHP programming to develop web applications.

CO5: Construct web applications using AJAX and web services.

LIST OF EQUIPMENT'S AND COMPONENTS

- Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server, WAMP/XAMPP.

19CSPC506 COMPUTER NETWORKS LABORATORY SEMESTER V

L	T	P	C
0	0	3	1.5

COURSE 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:
    i. Echo client and Echo server
    ii. Chat
    iii. 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 NS3
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 Cyclic Redundancy Code.

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Implement various protocols using TCP and UDP.
CO2: Compare the performance of different transport layer protocols.
CO3: Use simulation tools to analyze the performance of various network protocols.
CO4: Analyze various routing algorithms.
CO5: Implement error correction codes.

LIST OF EQUIPMENT'S AND COMPONENTS

- Software Required – C / C++ / Java / Python / Equivalent Compiler Network simulator like NS3/OPNET IT Guru / Wireshark packet analyzer / Packet Tracer / Equivalent.
- Hardware Required – Standalone desktops 30 Nos.

19CAHS003 COMMUNICATION SKILLS LABORATORY SEMESTER V

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

- To equip students with the English language skills required for the successful academic studies on speaking and listening skills.
- To provide guidance and practice in basic general and classroom conversation.
- To strengthen the reading skills of students of engineering.
- To enhance their writing skills with specific reference to technical writing.
- To develop effective communication skills.

UNIT-I: 6

Listening – Listening & answering – listening to a lecture & pronunciation – **Speaking** – Giving & asking personal information – **Reading** – Strategies for effective reading and Reading comprehension – **Writing** – Develop a paragraph: topic sentence, supporting sentences and concluding sentence – Descriptive paragraph writing.

UNIT-II: 6

Listening – Listening to process information – stress & intonation patterns – **Speaking** – small talk – converse with reasonable accuracy over a wide range of everyday topics – **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 – Opinion paragraph writing.

UNIT-III: 6

Listening – Lexical chunking for accuracy and fluency – factors influence fluency – listen for and follow the gist – listen for details – **Speaking** – Informal talk – describing health & symptoms – **Reading** – Connectors and Pronouns in a passage – speed reading techniques – **Writing** – Elements of a good essay – Types of essays – Descriptive, narrative, issue-based, argumentative and analytical.

UNIT-IV: 6

Listening – Active listening – **Speaking** – giving verbal and non-verbal feedback – Listening & participating in conversations – Strategies for presentations: group/pair presentations – **Reading** – Genre and Organization of Ideas – **Writing** – Email writing – visumes – Job application – project writing – writing convincing proposals.

UNIT-V: 6

Listening – Listening & responding to explanations in academic & business contexts – Speaking – Participating in a group discussion – **Reading** – Critical reading and thinking – understanding how the text positions the reader – **Writing** – Statement of Purpose – letter of recommendation – Vision statement.

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 30 Periods Total: 30 Periods

REFERENCES:

1. Ladousse, Gillian Porter, “Role Play”, Oxford University Press: Oxford, 2014.
2. Hughes, Glyn and Josephine Moate, “Practical English Classroom”, Oxford University

Press: Oxford, 2014.
3. Davis, Jason and Rhonda LIss, “Effective Academic Writing (Level 3)”, Oxford University Press: Oxford, 2006.
4. Debra Daise, Charl Norloff, and Paul Carne, “Reading and Writing (Level 4)” Oxford University Press: Oxford, 2011.
5. Withrow, Jeans and et al, “Inspired to Write. Readings and Tasks to develop writing skills”, Cambridge University Press: Cambridge, 2004.
6. Robert M Sherfield and et al. “Developing Soft Skills” 4th edition, New Delhi: Pearson Education, 2009.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Listen and respond appropriately.
CO2: Make effective presentations and participate in group discussions
CO3: Read and evaluate texts critically.
CO4: Write winning job applications.
CO5: Display critical thinking in various professional contexts.

19CSPC601 ARTIFICIAL INTELLIGENCE SEMESTER VI

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To make the students 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 – 8 puzzle, Tower of Hanoi and Water Jug problems.

9

UNIT-II: PROBLEM SOLVING METHODS

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.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Russell S and Norvig P., "Artificial Intelligence: A Modern Approach, Prentice Hall, 4th Edition, 2020.
2. Bratko I., "Prolog: Programming for Artificial Intelligence", 4th Edition, Addison-Wesley Educational Publishers Inc., 2011.
3. Tim Jones M., "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc.; First Edition, 2008.
4. Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2009.
5. William F. Clocksin and Christopher S. Mellish, "Programming in Prolog: Using the ISO

Standard", 5th Edition, Springer, 2003.
6. Gerhard Weiss, "Multi Agent Systems II", 2nd Edition, MIT Press, 2013.
7. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Use appropriate search algorithms for any AI problem.
CO2: Represent a problem using first order and predicate logic.
CO3: Provide the apt agent strategy to solve a given problem.
CO4: Design software agents to solve a problem.
CO5: Design applications for NLP that use Artificial Intelligence.

19CSPC602 **COMPILER DESIGN** **SEMESTER VI**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

UNIT-I: INTRODUCTION TO COMPILERS **9**

Translators – Compilation and Interpretation – Language processors –The phases of compiler-errors encountered in different phases – The grouping of phases – Compiler construction tools programming language basics.

UNIT-II: LEXICAL ANALYSIS **9**

Need and role of Lexical analyzer – Lexical errors – Expressing tokens by regular expressions converting regular expression to DFA – Minimization of DFA – Language for specifying lexical analyzers – LEX.

UNIT-III: SYNTAX ANALYSIS **9**

Need and role of the parser – Context free grammars –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-IV: INTERMEDIATE CODE GENERATION **9**

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-V: CODE GENERATION AND CODE OPTIMIZATION **9**

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 – Principal sources of optimization – Peep-hole optimization – DAG – Optimization of basic blocks – Global data flow analysis – Efficient data flow algorithm.

Contact Periods:

Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**

REFERENCES:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi and Jeffrey D. Ullman, “Compilers – Principles, Techniques and Tools”, 2nd Edition, Pearson Education, 2007.
2. Randy Allen and Ken Kennedy, “Optimizing Compilers for Modern Architectures: A Dependence-based Approach”, Morgan Kaufmann Publishers, 2002.
3. Steven S. Muchnick, “Advanced Compiler Design and Implementation”, Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
4. Keith D. Cooper and Linda Torczon, “Engineering a Compiler”, Morgan Kaufmann Publishers Elsevier Science, 2004.

5. Charles N. Fischer, Richard. J. LeBlanc, “Crafting a Compiler with C”, Pearson Education, 2008.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Analyze the different phases of compiler.
CO2: Design a lexical analyzer for a sample language.
CO3: Apply different parsing algorithms to develop the parsers for a given grammar.
CO4: Interprets syntax-directed translation and code generation.
CO5: Learn to implement code optimization techniques and a simple code generator.

19CSPC603 **MOBILE COMPUTING** **SEMESTER VI**

L	T	P	C
3	0	0	3

COURSE 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 Adhoc 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 Adhoc 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.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Jochen Schiller, “Mobile Communications”, PHI, 2nd Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt.Ltd, New Delhi, 2012.
3. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
4. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
5. William C.Y. Lee, “Mobile Cellular Telecommunications-Analog and Digital Systems”, 2nd Edition, Tata McGraw Hill Edition, 2006.
6. Toh C.K., “AdHoc Mobile Wireless Networks”, 1st Edition, Pearson Education, 2002.
7. Maritn Sauter, “From GSM to LTE: An Introduction to Mobile Networks and Mobile

Broadband", John Wiley and Sons, 2011.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Explain the basics of mobile telecommunication systems.
CO2: Illustrate the generations of telecommunication systems in wireless networks.
CO3: Determine the functionality of MAC, network layer and Identify a routing protocol for a given Adhoc network.
CO4: Explain the functionality of transport and application layers.
CO5: Develop a mobile application using android/blackberry/iOS/Windows SDK.

19CSPC604 SOFTWARE ENGINEERING SEMESTER VI

L	T	P	C
3	0	0	3

COURSE 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.

UNIT-V: PROJECT MANAGEMENT 9

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.

Contact Periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", 7th Edition, Mc Graw-Hill International Edition, 2010.
2. Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.
3. Rajib Mall, "Fundamentals of Software Engineering", 3rd Edition, PHI Learning Private Limited, 2009.
4. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
5. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.
6. Stephen R. Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
CO1: Identify the impact of software development process.
CO2: Concepts of requirements engineering and analysis modeling.
CO3: Apply systematic procedure for software design and deployment.
CO4: Compare and contrast the various testing and maintenance.
CO5: Compare different process models, manage project schedule, estimate project cost and effort required.

19CSPC605 MOBILE APPLICATION DEVELOPMENT LABORATORY

SEMESTER VI

L	T	P	C
0	0	3	1.5

COURSE 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 Colors
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)

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Develop mobile applications using GUI and layouts.

CO2: Develop mobile applications using event listener.

CO3: Develop mobile applications using databases.

CO4: Develop mobile applications using RSS Feed, Internal/External storage, SMS, Multi-threading and GPS.

CO5: Analyze and discover own mobile app for simple needs.

LIST OF EQUIPMENT'S AND COMPONENTS

- Standalone desktops with Windows or Android or iOS or Equivalent Mobile Application Development. Tools with appropriate emulators and debuggers - 30 Nos.

19CSPC606 COMPILER DESIGN LABORATORY SEMESTER VI

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

- To be exposed to compiler writing tools.
- To Learn to implement the different phases of compiler.
- To be familiar with assembly code generation.
- To learn simple optimization techniques.

LIST OF EXPERIMENTS:

1. Implementation of symbol table.
2. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)
3. Implement a Lexical analyzer using Lex tool.
4. Implement an arithmetic calculator using LEX and YACC.
5. Program to recognize a valid variable which starts with a letter followed by any number of letters or digits using LEX and YACC.
6. Program to recognize a valid arithmetic expression that uses operator +, - , * and / using LEX and YACC.
7. Implement type checking.
8. Generate three address code for a simple program using LEX and YACC.
9. Implement simple code optimization techniques (Constant folding, Strength reduction and Algebraic transformation).
10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Implement the different Phases of compiler using tools.

CO2: Optimize a given program.

CO3: Generate an assembly language program equivalent to a source language program.

LIST OF EQUIPMENT'S AND COMPONENTS

- Standalone desktops with C / C++ compiler.
- Compiler writing tools LEX and YACC.

19CSPC701 CRYPTOGRAPHY AND NETWORK SECURITY SEMESTER VII

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand number theory used for network security.
- To understand the design concept of cryptography and authentication.
- To understand the design concepts of internet security.
- To develop experiments on algorithm used for security.

UNIT-I: INTRODUCTION **9**

Security trends – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: Substitution techniques, Transposition techniques, steganography – Number theory: Introduction to Number theory Euclid's algorithm (extended), Totient function, Testing for Primality, Fermat's and Euler's theorem – The Chinese remainder theorem – Exponentiation and logarithm.

UNIT-II: SYMMETRIC KEY CRYPTOGRAPHY **9**

Data Encryption Standard (DES) algorithm – Overview of the DES algorithm; Double and Triple DES – Double DES, Triple DES; Security of the DES; Advanced Encryption Standard (AES).

UNIT-III: PUBLIC KEY CRYPTOGRAPHY **9**

Asymmetric Key Ciphers: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange – ElGamal cryptosystem – Elliptic curve Arithmetic – Elliptic curve cryptography.

UNIT-IV: MESSAGE AUTHENTICATION AND INTEGRITY **9**

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA – Digital signature and authentication protocols – DSS – Entity Authentication: Biometrics, Passwords, Challenge Response protocols – Authentication applications – Kerberos, X.509.

UNIT-V: SECURITY PRACTICE AND SYSTEM SECURITY **9**

Electronic Mail security – PGP, S/MIME – IP security – Web Security – System Security: Intruders – Malicious software – Viruses – Firewalls.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. William Stallings, "Cryptography and Network Security: Principles and Practice", PHI 7th Edition, 2017.
2. Shyamala C.K, Harini N and Dr. Padmanabhan T. R., "Cryptography and Network Security", Wiley India Pvt. Ltd, 2011
3. Behrouz A. Foruzan, "Cryptography and Network Security", Tata McGraw Hill 2007.
4. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security: Private Communication in a Public World", Prentice Hall, ISBN 0-13-046019-2.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Learn the fundamentals of networks security, security architecture, threats and vulnerabilities.

CO2: Apply the different cryptographic operations of symmetric cryptographic algorithms.

CO3: Apply the different cryptographic operations of public key cryptography.

CO4: Apply the various Authentication schemes to simulate different applications.

CO5: Learn various Security practices and analyze system security standards.

19CSPC702 **DATA ANALYTICS** **SEMESTER VII**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the competitive advantages of data analytics.
- To understand the big data frameworks.
- To learn data analysis methods.
- To learn stream computing.
- To gain knowledge on Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics.

UNIT-I: INTRODUCTION TO BIG DATA **9**

Big Data – Definition, Characteristic features – Big Data applications – Big Data vs Traditional data – Risks of Big Data – Structure of Big Data – Challenges of conventional systems – Web Data – Evolution of analytic scalability – Evolution of analytic processes, Tools and methods – Analysis vs Reporting – Modern Data Analytic tools.

UNIT-II: HADOOP AND SPARK **9**

Distributed File Systems – Large – Scale file system organization – HDFS concepts – Map Reduce execution, Algorithms using Map Reduce, Matrix – Vector multiplication – Hadoop YARN– Spark– Features of Spark – Spark built on Hadoop – Components of Spark – Mllib and machine learning.

UNIT-III: DATA ANALYSIS **9**

Statistical Methods: Regression modelling, Multivariate analysis – Classification: SVM & Kernel methods – Rule mining – Cluster analysis, Types of data in Cluster analysis, Partitioning methods, Hierarchical methods – Predictive analytics – Data analysis using R.

UNIT-IV: MINING DATA STREAMS **9**

Streams: Concepts – Stream Data Model and architecture – Sampling data in a stream – Mining Data Streams and Mining time – Series data – Real Time Analytics Platform (RTAP) applications – Case studies – Real Time Sentiment Analysis

UNIT-V: BIG DATA FRAMEWORKS **9**

Introduction to NoSQL – Aggregate data models – Hbase: Data Model and Implementations – Hbase Clients – Examples – Cassandra: Data model – Examples – Cassandra clients – Hadoop integration. Pig – Grunt – Pig Data Model – Pig Latin – Developing and testing Pig Latin scripts. Hive – Data types and File formats – HiveQL Data definition – HiveQL Data manipulation – HiveQL queries.

Contact Periods:

Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**

REFERENCES:

1. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, Wiley and SAS Business Series, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques NoSQL and Graph”, 2013.
3. Michael Berthold and David J. Hand, “Intelligent Data Analysis”, Springer, 2nd Edition,

2007.
4. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, “Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses”, Wiley, 2013.
5. Sadalage P.J and Fowler M., “NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence”, Addison-Wesley Professional, 2012.
6. Jiawei Han and Micheline Kamber “Data Mining Concepts and Techniques”, 2nd Edition, Elsevier, Reprinted 2008.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Learn how to leverage the insights from big data analytics
CO2: Design distributed file systems
CO3: Analyze data by utilizing various statistical and data mining approaches
CO4: Apply Stream data model.
CO5: Apply the various NoSql alternative database models

19CSHS703 PRINCIPLES OF MANAGEMENT SEMESTER VII

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To enable the students to study the evolution of Management.
- To learn the functions and principles of management.
- 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 behavior – 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.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Stephen P. Robbins and Mary Coulter, “Management”, Prentice Hall (India) Pvt. Ltd., 14th Edition, 2017.
2. JAF Stoner, Freeman R.E and Daniel R. Gilbert, “Management”, Pearson Education, 6th Edition, 2004.
3. Harold Koontz and Heinz Weihrich, “Essentials of management”, Tata McGraw Hill, 8th edition 2008.
4. Robert Kreitner and Mamata Mohapatra, “Management”, Biztantra, 2008.

5. Tripathy PC and Reddy PN, “Principles of Management”, Tata McGraw Hill, 1999.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Have same basic knowledge on international aspect of management.
CO2: Use managerial function planning.
CO3: Use managerial function organizing and staffing.
CO4: Use managerial function Directing.
CO5: Use managerial function controlling.

19CSPC704 **SECURITY LABORATORY** **SEMESTER VII**

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

- To understand the design concept of cryptography and authentication.
- To understand the design concepts of internet security.
- To develop experiments on algorithm used for security.

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

Contact Periods:

Lecture: 0 Periods **Tutorial: 0 Periods** **Practical: 45 Periods** **Total: 45 Periods**

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Develop code for classical Encryption Techniques to solve the problems.
CO2: Build cryptosystems by applying symmetric and public key encryption algorithms.
CO3: Construct code for authentication algorithms.
CO4: Develop a signature scheme using Digital signature standard.
CO5: Demonstrate the network security system using open source tools.

LIST OF EQUIPMENT'S AND COMPONENTS

- Software: C / C++ / Java or equivalent compiler GnuPG, Snort, N-Stalker or Equivalent.
- Hardware: Standalone desktops – 30 Nos. (or) Server supporting 30 terminals or more.

19CSPC705 DATA ANALYTICS LABORATORY SEMESTER VII

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:

- To implement programs using Hadoop and Spark for processing big data.
- To analyze big data using linear models.
- To analyze big data using machine learning techniques such as SVM / Decision tree classification and clustering.
- To realize storage of big data using H base, Mongo DB.

LIST OF EXPERIMENTS:

Hadoop

1. Install, configure and run Hadoop and HDFS
2. Implement word count / frequency programs using MapReduce
3. Implement an MR program that processes a weather dataset

Spark

4. Install, configure and run Spark
5. Implement word count / frequency programs using Spark
6. Implement Machine learning using Spark

R Programming

7. Implement Linear and logistic Regression
8. Implement SVM / Decision tree classification techniques
9. Implement clustering techniques
10. Visualize data using any plotting framework
11. Implement an application that stores big data in Hbase / MongoDB / Pig using Hadoop /R

CONTACT PERIODS

Lecture: 0 Periods Tutorial: 0 Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon successful completion of the course, students should be able to:

CO1: Develop Programs to process big data in Hadoop.
CO2: Develop Programs to process big data in Spark.
CO3: Design Machine Learning Applications using Mllib in Spark.
CO4: Apply linear and logistic regression models using R.
CO5: Perform graphical data analysis using R.

LIST OF EQUIPMENT'S AND COMPONENTS

- Hadoop ,YARN, Spark ,R Package, Hbase, MongoDB

19CAEE001	PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP	SEMESTER VII L T P C 0 0 6 3

COURSE OBJECTIVES:

- To empower students with over all Professional and Technical skills required to solve a real world problem.
- To mentor the students to approach a solution through various stages of ideation, Research, Design Thinking, workflows, architecture and building a prototype in keeping with the end-user and client needs.
- To provide experimental learning to enhance the Enterpreneurship and employability skills of the students.

This course is a four months immersive program to keep up with the industry demand and to have critical thinking, team based project experience and timely delivery of modules in a project that solves world problems using emerging technologies.

To prepare the students with digital skills for the future, the Experiential Project Based Learning is introduced to give them hands-on experience using digital technologies on open-source platforms with an end-to-end journey to solve a problem. By the end of this course, the student understands the approach to solve a problem with team collaboration with mentoring from industry and faculties. This is an EEC category course offered as an elective under the type, “Experimental Project Based Learning”.

Highlights of this course:

- Students undergo training on emerging technologies
- Students develop solutions for real world use cases
- Students work with mentors to learn and use industry best practices
- Studnets access and use self-learning courses on various technologies, approaches and methodologies.
- Collabarate in teams with other students working on the same topic
- Have a dedicated mentor to guide

The Course will involve 40 – 50 hours of technical training and 40-50 hours of project Development. The activities involved in the project along with duration are given in Table 1.

Table 1 Activities

Activity Name	Activity Description	Time (weeks)
Choosing a Project	Selecting a project from the list of projects categorized various technologies & business domains	2
Team Formation	Students shall form a team of 4 Members before enrolling to a project. Team Members shall distribute the project activities among themselves.	1

Hands on Training	Students will be provided with hands-on training on selected technology in which they are going to develop the project.	2
Project Development	Project shall be developed in agile mode. The status of the project shall be updated to the mentors via appropriate platform.	6
Code submission, Project Doc and Demo	Project deliverables must include the working code, Project Document and demonstration video.	3
Mentor Review and Approval	Mentor will be reviewing the project deliverables as per the milestone schedule and the feedback will be provided to the team.	1
Evaluation and scoring	Evaluators will be assigned to the team to evaluate the project deliverables, and the scoring will be provided based on the evaluation metrics	1
Total		**16 Weeks**

Essentially, it involves 15 weeks of learning and doing, and one week for evaluation. The evaluation will be carried out to assess technical and soft skills as given in Table 2.

Table 2: Evaluation Schema

	Skills		**Weightage**
I	**Technical Skills**		
	1.	Technical Training & Assignment	20%
	2.	Project Planning	5%
	3.	Requirement Analysis	5%
	4.	Project Design	5%
	5.	Innovation	5%
	6.	Technology Stack (Utilization of various APIs, tools, techniques)	5%
	7.	Coding	15%
	8.	Acceptance Testing	5%
	9.	Performance	5%
II	**Soft Skills**		
	1.	Team Work	5%
	2.	Time management	10%
	3.	Attendance and Punctuality	5%
	4.	Project Documentation	5%
	5.	Project Demonstration	5%
Total Score			100%

Contact Periods:
Lecture: 0 Periods Tutorial: 0 Periods Practical:45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Upskill in emerging technologies and apply to real industry-level use cases
CO2: Understand agile development process
CO3: Develop career readiness competencies, Team Skills/ Leadership qualities
CO4: Develop time management, Project Management skills and communication skills
CO5: Use critical thinking for innovative problem solving
CO6: Develop entrepreneurship skills to independently work on products.

19CSEE801 **PROJECT WORK** **SEMESTER VIII**

L	T	P	C
0	0	16	8

COURSE 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.

Contact Periods:

Lecture: 0 Periods Tutorial: 0 Periods Practical:240 Periods Total: 240 Periods

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: On completion of the project work students will be in a position to take up their project work to formulating proper model.

19CSPE501 OBJECT ORIENTED ANALYSIS AND DESIGN SEMESTER V

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the fundamentals of OO analysis and design skills.
- To design with static UML diagrams.
- To design with the UML dynamic and implementation diagrams.
- To improve the software design with design patterns.
- To expose to various testing techniques.

UNIT-I: INTRODUCTION 9

Introduction to OOAD – Object oriented methodologies – Rumbaugh methodology – Booch methodology – Jacobson methodology – Unified approach – Phases of unified process.

UNIT-II: UNIFIED MODELLING LANGUAGE 9

Introduction – Unified Modeling Language – UML diagrams – Inception – Use case modelling – Relating Use cases – Include, extend and generalization – Elaboration – Domain Model – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class hierarchies – Aggregation and Composition.

UNIT-III: LOGICAL ARCHITECTURE 9

UML interaction diagrams – System sequence diagram –Relationship between sequence diagrams and use cases – Collaboration diagram – State machine diagram and modelling – Activity diagram – Logical Architecture and UML package diagram – Component and Deployment diagrams.

UNIT-IV: DESIGN PATTERNS 9

GRASP: Designing objects with responsibilities – Creator – Information expert – Low coupling – Controller – High cohesion – Design patterns – Creational – Factory method – Structural – Bridge, Adapter - Behavioral – Strategy, observer – Applying GoF design patterns.

UNIT-V: CODING AND TESTING 9

Mapping design to code – Impact of object orientation on testing – Develop test cases and test plans – Issues in OO testing – Class testing – OO Integration testing – GUI testing – OO system testing.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Ali Bahrami , “Object Oriented System Development”, McGraw Hill International Edition, 1999.Practical English Usage, Michael Swan, OUP 1995.
2. Craig Larman, “Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development”, 3rd Edition, Pearson Education, 2005.
3. Erich Gamma, and Richard Helm, Ralph Johnson and John Vlissides, “Design patterns: Elements of Reusable Object-Oriented Software”, Addison-Wesley, 1995.
4. Simon Bennett, Steve Mc Robb and Ray Farmer, “Object Oriented Systems Analysis and Design Using UML”, 4th Edition, Mc-Graw Hill Education, 2010.

5. Ali Bahrami , “Object Oriented System Development”, McGraw Hill International Edition, 1999.Practical English Usage, Michael Swan, OUP 1995.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Design and implement projects using OO concepts.
CO2: Use the UML analysis and design diagrams.
CO3: Apply appropriate design patterns.
CO4: Identify and applying for the appropriate design methodology to develop real world applications.
CO5: Apply the testing techniques in the code development process.

19CSPE502 GRAPHICS AND MULTIMEDIA SEMESTER V

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To gain knowledge about graphics hardware devices and software used.
- To understand the 2D and 3D graphics and their transformations.
- To appreciate illumination and color models.
- To become familiar with clipping techniques and Blender Graphics.

UNIT-I: TWO-DIMENSIONAL GRAPHICS 9

Output primitives – Points and lines, Line drawing algorithms, Loading the frame buffer, Line function; Circle and ellipse generating algorithms; Pixel addressing and object geometry – Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, Composite transformations; Two-dimensional viewing – Viewing pipeline, Viewing coordinate reference frame; Window-to-viewport coordinate transformation, Two-dimensional viewing functions; Clipping operations – Point, Line, and Polygon clipping algorithms.

UNIT-II: THREE-DIMENSIONAL GRAPHICS 9

Three dimensional concepts; Three-dimensional object representations – Polygon surfaces – Polygon tables- Plane equations – Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Blobby objects; Spline representations – Bezier curves and surfaces – B-Spline curves and surfaces. Transformation and viewing: Three dimensional geometric and modeling transformations – Translation, Rotation, Scaling, Composite transformations; Three-dimensional viewing – Viewing pipeline, viewing coordinates, Projections, Clipping; Visible surface detection methods.

UNIT-III: ILLUMINATION AND COLOR MODELS 9

Light sources – Basic illumination models – Halftone patterns and dithering techniques; Properties of light – Standard primaries and chromaticity diagram; Intuitive color concepts – RGB color model – YIQ color model – CMY color model – HSV color model – HLS color model; Color selection.

UNIT-IV: MULTIMEDIA SYSTEM DESIGN & MULTIMEDIA FILE HANDLING 9

Multimedia basics − Multimedia applications − Multimedia system architecture − Evolving technologies for multimedia − Defining objects for multimedia systems − Multimedia data interface standards − Multimedia databases. Compression and decompression − Data and file format standards − Multimedia I/O technologies − Digital voice and audio − Video image and animation − Full motion video − Storage and retrieval technologies.

UNIT-V: HYPERMEDIA 9

Multimedia authoring and user interface − Hypermedia messaging − Mobile messaging − Hypermedia message component − Creating hypermedia message − Integrated multimedia message standards − Integrated document management − Distributed multimedia systems. Case Study: Blender Graphics Blender Fundamentals – Drawing Basic Shapes – Modelling – Shading & Textures.

Contact Periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2007.
2. Andleigh P.K and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2003.
3. Judith Jeffcoate, "Multimedia in practice: Technology and Applications", PHI, 1998.
4. Foley, Vandam, Feiner and Hughes, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2003.
5. Jeffrey McConnell, "Computer Graphics: Theory into Practice", Jones and Bartlett Publishers, 2006.
6. Hill F S Jr., "Computer Graphics", Maxwell Macmillan , 1990.
7. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R. Marschner, Erik Reinhard, Kelvin Sung, and AK Peters, "Fundamentals of Computer Graphics", CRC Press, 2010.
8. William M. Newman and Robert F. Sproull, "Principles of Interactive Computer Graphics", Tata Mc Graw Hill 1978.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Design two-dimensional graphics and apply two dimensional transformations.
CO2: Design three-dimensional graphics and apply three dimensional transformations.
CO3: Apply Illumination and color models.
CO4: Implement different types of multimedia file format.
CO5: Design basic 3D scenes using blender.

19CSPE503 ADVANCED ALGORITHMS SEMESTER V

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the principles of iterative and recursive algorithms.
- To learn concurrent data structures.
- To develop dynamic and greedy algorithms.
- To get an awareness of NP completeness and randomized algorithms.

UNIT-I: INTRODUCTION 9

The Role of algorithms in computing – Getting started – Growth of functions – Divide-and-conquer – The maximum – Subarray problem – Strassen‘s algorithm for matrix multiplication – The substitution method for solving recurrences – The recurrence tree method for solving recurrences – The master method for solving recurrences – Probabilistic analysis and randomized algorithms – The hiring problem – Random variables – Randomized algorithms. Amortized analysis – Aggregate analysis – The accounting method – The potential method – Dynamic tables.

UNIT-II: HEAP 9

Min-Max heaps – Deaps – Leftist heaps –Binomial heaps – Fibonacci heaps – Skew heaps – Lazy-binomial heaps.

UNIT-III: TREE 9

Optimal binary search trees – AVL trees – 2-3 trees – 2-3-4 trees – Red-black trees – B-trees – splay trees – Tries.

UNIT-IV: DESIGN AND ANALYSIS TECHNIQUES 9

Dynamic programming – Matrix chain multiplication – Elements of dynamic programming – Longest common sequences Greedy Algorithms – Activity selection problem – Elements of greedy strategy – Huffman code. String matching – The naïve string – Matching algorithm – The Robin-Karp algorithm – String matching with finite automata – The Knuth-Morris-Pratt algorithm.

UNIT-V: NP COMPLETE AND APPROXIMATION PROBLEM 9

NP-Completeness – Polynomial time – Polynomial time verification – NP-complete problems – Approximation algorithms – The vertex-cover problem – The traveling salesman problem – The set-covering problem.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES

1. Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, “Fundamentals of Data Structures in C++”, 2nd Edition, Universities Press, Hyderabad, 2008.
2. Thomas H. Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, “Introduction to Algorithms”, 3rd Edition, Prentice Hall of India, New Delhi, 2009.
3. Horowitz E , Sahni S and Rajasekaran S., “Fundamentals of Computer Algorithms”, 2nd Edition, University Press, 2008.
4. David P. Williamson and David B.Shmoys, “The Design of Approximation Algorithms”,

Cambridge University Press, 2011.
5. Jon Kleinberg, “Algorithm Design”, Addison-Wesley, 2013.
6. Herlihy M and Shavit N, “The Art of Multiprocessor Programming”, Morgan Kaufmann, 2012.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Show the ability to analyze algorithms.
CO2: Ability to have knowledge of heap concepts.
CO3: Demonstrate different methods for traversing trees.
CO4: Solve problems by implementing learned algorithm design techniques and data structures.
CO5: Design approximation algorithms and NP-completeness.

19CSPE504 DATA WAREHOUSING AND DATA MINING SEMESTER V

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To Build data warehouse using data model, warehouse architecture and OLAP server.
- To learn about association mining techniques used for the development of efficient data mining system.
- To understand classification and prediction methods.
- To learn clustering the data using clustering techniques and Applications of data mining.
- To know Weka tool and R programming.

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

Basic concepts – Data warehousing components – Building a data warehouse – Data base architectures for parallel processing – Parallel DBMS vendors – Multi dimensional data model – Data warehouse schemas for decision support, Concept hierarchies –Characteristics of OLAP systems – Typical OLAP operations, OLAP and OLTP.

UNIT-II: INTRODUCTION TO DATA MINING 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 AND R PROGRAMMING 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 – Introduction to R Programming – Data Mining Using R.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

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

2. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, 35th Reprint 2016.
3. Soman K.P, Shyam Diwakar and Ajay V., “Insight into Data Mining Theory and Practice”, Eastern Economy Edition, Prentice Hall of India, 2006.
4. Ian H. Witten and Eibe Frank, Mark A. Hall, Christopher J. Pal “Data Mining: Practical Machine Learning Tools and Techniques”, Elsevier, 4th Edition, 2016.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Design a Data warehouse system and perform business analysis with OLAP tools.
CO2: Apply suitable pre-processing and visualization techniques for data analysis.
CO3: Apply frequent pattern and association rule mining techniques for data analysis.
CO4: Design appropriate classification and clustering techniques for data analysis.
CO5: Analyze the data using Weka tool and R Programming.

19CSPE505 ALGEBRA AND NUMBER THEORY SEMESTER V

L	T	P	C
3	0	0	3

COURSE 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 9

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 9

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

UNIT-III: DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS 9

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 9

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 9

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

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES

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

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Apply the basic notions of groups, rings, fields, which will then be used to solve related problems

CO2: Discovered the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.

CO3: Demonstrate accurate and efficient use of advanced algebraic techniques.

CO4: Demonstrate their mastery by solving non – trivial problems related to the concepts, and by proving simple theorems about the, statements proven by the text.

CO5: Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

19CSPE601 DIGITAL SIGNAL PROCESSING SEMESTER VI

L	T	P	C
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COURSE OBJECTIVES:

- To understand the basics of discrete time signals, systems and their classifications.
- To analyze the discrete time signals in both time and frequency domain.
- To design low pass digital IIR filters according to predefined specifications based on analog filter theory and analog-to-digital filter transformation.
- To design Linear phase digital FIR filters using Fourier method, window technique.
- To realize the concept and usage of DSP in various engineering fields.

UNIT-I: DISCRETE TIME SIGNALS AND SYSTEMS 9

Introduction to DSP – Basic elements of DSP – Sampling of continuous time signals – Representation, Operation and classification of discrete time signal – Classification of discrete time systems – Discrete convolution: Linear and circular – Correlation.

UNIT-II: ANALYSIS OF LTI DISCRETE TIME SIGNALS AND SYSTEMS 9

Analysis of LTI Discrete time systems using DFT – Properties of DFT – Inverse DFT – analysis of LTI Discrete time systems using FFT algorithms – Inverse DFT using FFT algorithm.

UNIT-III: INFINITE IMPULSE RESPONSE FILTERS 9

Frequency response of Analog and Digital IIR filters – Realization of IIR filter – Design of analog low pass filter – Analog to Digital filter transformation using Bilinear transformation and Impulse Invariant method – Design of digital IIR filters (LPF, HPF, BPF, and BRF) using various transformation techniques.

UNIT-IV: FINITE IMPULSE RESPONSE FILTERS 9

Linear Phase FIR filter – Phase delay– Group delay – Realization of FIR filter – Design of causal and Non-causal FIR filters (LPF, HPF, BPF and BRF) using window method (Rectangular, Hamming window, Hanning window) – Frequency sampling technique.

UNIT-V: APPLICATIONS OF DSP 9

Multirate signal processing: Decimation, Interpolation, Spectrum of the sampled signal – Processing of audio and radar signal.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing – Principles, Algorithms & Applications", 4th Edition, Pearson Education / Prentice Hall, 2007.
2. Richard G.Lyons, "Understanding Digital Signal Processing", 2nd Edition, Pearson Education.
3. Oppenheim A.V, Schafer R.W and Buck J.R., "Discrete-Time Signal Processing", 8th Indian Reprint, Pearson, 2004.
4. Emmanuel C. Ifeachor, and Barrie W. Jervis, "Digital Signal Processing", 2nd Edition, Pearson Education / Prentice Hall, 2002.
5. William D. Stanley, "Digital Signal Processing", 2nd Edition, Reston Publications.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Perform mathematical operations on signals.

CO2: Model the sampling theorem and perform sampling on continuous-time signals to get discrete time signal by applying advanced knowledge of the sampling theory.

CO3: Transform the time domain signal into frequency domain signal and vice-versa.

CO4: Apply the relevant theoretical knowledge to design the digital IIR/FIR filters for the given analog specifications.

CO5: Identify the applications of DSP.

19CSPE602 ADHOC AND SENSOR NETWORKS SEMESTER VI

L	T	P	C
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COURSE OBJECTIVES:

- To learn the problem and challenge in design of ad hoc sensors networks.
- To recognize the broad range of applicability of these networks.
- To learn about the major design issues for adhoc and sensor networks.
- To understand various protocol mechanisms, resource constraints and security issues in sensor networks.

UNIT-I: INTRODUCTION 9

Fundamentals of wireless communication technology – The electromagnetic spectrum – Radio propagation mechanisms – Characteristics of the wireless channel – Mobile Adhoc networks (MANETs) and Wireless Sensor Networks (WSNs): Concepts and architectures. WLL – Wireless ATM – IEEE 802.16 Standard. Applications and design challenges of Adhoc and Sensor networks.

UNIT-II: MAC PROTOCOLS FOR ADHOC AND NETWORKS SENSORS 9

Design issues – Classification of MAC Protocols – Contention based Protocols – MACAW, FAMA – Contention based reservation scheme – D-PRMA, RTMAC – Contention based with scheduling mechanisms – DPS, DLPS, Multi channel MAC - IEEE 802.11

UNIT-III: ROUTING PROTOCOLS AND TRANSPORT LAYER 9

Design issues and Classification – Table-driven (DSDV, CGSR), On-demand (AODV, DSR) – Hybrid routing protocols (ZRP) – Routing protocols with efficient flooding mechanisms (PLBRP) – Transport Layer protocol for Adhoc networks – Design Goals of a Transport Layer Protocol for Adhoc Wireless Networks – Classification of Transport Layer solutions – TCP over Ad hoc wireless – Security in Adhoc Wireless Networks

UNIT-IV: WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS 9

WSN Network architecture: typical network architectures – data relaying and aggregation strategies, Data Dissemination and Gathering – MAC – Localization and Tracking MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC – IEEE 802.15.4.

UNIT-V: SECURITY IN ADHOC AND SENSOR NETWORKS 9

Security Attacks – Key Distribution and Management – Intrusion Detection – Software based Anti-tamper techniques – Water marking techniques – Defense against routing attacks – Secure Adhoc routing protocols – Broadcast authentication WSN protocols – TESLA – Biba – Sensor Network Security Protocols – SPINS

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Siva Ram Murthy C and Manoj B.S., "Adhoc Wireless Networks: Architectures and Protocols", Pearson Education, 2008.
2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks: Theory and Applications", 2nd Edition, World Scientific Publishing, 2011.
3. Labiod H, "Wireless Adhoc and Sensor Networks", Wiley, 2008.
4. Li X., "Wireless ad-hoc and sensor Networks: theory and applications", Cambridge

University Press, 2008.
5. Ramin Hekmat, "Adhoc Networks: Fundamental Properties and Network Topologies", 1st Edition, Springer, 2006.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Express the fundamental concepts of ad hoc and sensor networks.
CO2: Describe the challenges of designing MAC protocol in adhoc networks.
CO3: Relate the routing protocols with transport layer.
CO4: Explain the WSN architecture and MAC layer.
CO5: Outline the security in adhoc and sensor networks.

19CSPE603 DISTRIBUTED SYSTEMS SEMESTER VI

L	T	P	C
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COURSE 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.

UNIT-III: DISTRIBUTED MUTEX & DEADLOCK 9

Distributed mutual exclusion algorithms: Introduction – Preliminaries – Lamport‘s algorithm – Ricart – Agrawala algorithm – Maekawa‘s algorithm – Suzuki–Kasami‘s broadcast algorithm. Deadlock detection in distributed systems: Introduction – System model – Preliminaries – Models of deadlocks – Knapp‘s classification – Algorithms for the single resource model, the AND model and the OR model.

UNIT-IV: RECOVERY & CONSENSUS 9

Check pointing and rollback recovery: Introduction – Background and definitions – Issues in failure recovery – Checkpoint – Based recovery – Log– based rollback recovery – Coordinated check pointing algorithm – Algorithm for asynchronous check pointing and recovery. Consensus and agreement algorithms: Problem definition – Overview of results – Agreement in a failure-free system – Agreement in synchronous systems with failures.

UNIT-V: P2P & DISTRIBUTED SHARED MEMORY 9

Peer-to-peer computing and overlay graphs: Introduction – Data indexing and overlays – Chord – Content addressable networks – Tapestry. Distributed shared memory: Abstraction and advantages – Memory consistency models – Shared memory mutual exclusion.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Kshemkalyani, Ajay D, and Mukesh Singhal, “Distributed computing: principles, algorithms and systems”, Cambridge University Press, 2011.
2. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, 5th Edition, Pearson Education, 2012.
3. Pradeep K. Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
4. Mukesh Singhal and Niranjan G. Shivaratri, “Advanced concepts in operating systems”, McGraw-Hill, Inc., 1994.
5. Tanenbaum A.S and Van Steen M., “Distributed Systems: Principles and Paradigms”, Pearson Education, 2007.
6. Liu M.L., “Distributed Computing, Principles and Applications”, Pearson Education, 2004.
7. Nancy A. Lynch, “Distributed Algorithms’, Morgan Kaufman Publishers, USA, 2003.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Elucidate the foundations and issues of distributed systems.

CO2: Organize the various synchronization issues and global state for distributed systems.

CO3: Analyze the Mutual Exclusion and Deadlock detection algorithms in distributed systems.

CO4: Describe the agreement protocols and fault tolerance mechanisms in distributed systems.

CO5: Describe the features of peer-to-peer and distributed shared memory systems.

19CSPE604 **CLOUD COMPUTING** **SEMESTER VI**

L	T	P	C
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COURSE 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: VIRTUALIZATION **9**

Virtualization: Basics of virtualization – Types of virtualization – Implementation levels of Virtualization – Virtualization structures – Tools and mechanisms – Virtualization of CPU, Memory, I/O Devices – Virtual clusters and resource management – Virtualization for data – center Automation.

UNIT-III: CLOUD ARCHITECTURE, SERVICES AND STORAGE **9**

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 **9**

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: PROGRAMMING MODEL **9**

Hadoop – Map reduce – Virtual box – Google app engine – Programming environment for Google App engine –Federation in the cloud – Four levels of federation – Federated services and applications – Future of federation. Cloud software environments–Eucalyptus–Open Nebula, Open Stack, Nimbus, Cloud Sim.

Contact Periods:

Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**

REFERENCES:

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.
3. Rajkumar Buyya, Christian Vecchiola, Thamarai Selvi S., “Mastering Cloud Computing”, Tata Mcgraw Hill, 2013.

4. Toby Velte, Anthony Velte and Robert Elsenpeter, "Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
5. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)", O'Reilly, 2009.
6. Tom White, "Hadoop: The Definitive Guide", Yahoo Press, 2012.
7. Tim Mather, Subra Kumaraswamy, and Shahed Latif , "Cloud Security and Privacy", O'Reilly Media, Inc.,2009.
8. David E.Y. Sarna "Implementing and Developing Cloud Computing Applications", Auerbach Publication, 2011.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Articulate the main concepts, key technologies, strengths and limitations of cloud computing.

CO2: Learn the key and enabling technologies that help in the development of cloud.

CO3: Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.

CO4: Explain the core issues of cloud computing such as resource management and security.

CO5: Install and use current cloud technologies.

19CSPE605 GRAPH THEORY AND APPLICATIONS SEMESTER VI

L	T	P	C
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COURSE OBJECTIVES:

- To understand fundamentals of graph theory.
- To study proof techniques related to various concepts in graphs.
- To explore modern applications of graph theory.

UNIT-I: INTRODUCTION 9

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits – Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

UNIT-II: TREES AND CONNECTIVITY 9

Trees – Properties– Distance and Centres – Types – Rooted tree – Tree Enumeration Labeled tree – Unlabeled tree – Spanning tree – Fundamental circuits – Cut sets – Properties – Fundamental circuit and Cut-set-Connectivity – Separability – Related theorems.

UNIT-III: COLOURING AND DIRECTED GRAPH 9

Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

UNIT-IV: PERMUTATIONS & COMBINATIONS 9

Fundamental principles of counting – Permutations and combinations – Binomial theorem – Combinations with repetition – Combinatorial numbers – Principle of inclusion and exclusion – Derangements – Arrangements with forbidden positions.

UNIT-V: GENERATING FUNCTIONS 9

Generating functions – Partitions of integers – Exponential generating function – Summation operator – Recurrence relations – First order and second order – Non-homogeneous recurrence relations – Method of generating functions.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Narsingh Deo, “Graph Theory: With Application to Engineering and Computer Science”, Prentice Hall of India, 2003.
2. Grimaldi R.P., “Discrete and Combinatorial Mathematics: An Applied Introduction”, Addison Wesley, 4th edition,1999.
3. Clark J and Holton D.A., “A First Look at Graph Theory”, Allied Publishers, 1995.
4. Mott J.L, Kandel A and Baker T.P., “Discrete Mathematics for Computer Scientists and Mathematicians”, Prentice Hall of India, 1996.
5. Liu C.L., “Elements of Discrete Mathematics”, Mc Graw Hill, 1985.
6. Rosen K.H., “Discrete Mathematics and Its Applications”, Mc Graw Hill, 2007.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Write precise and accurate mathematical definitions of objects in graph theory.
CO2: Use mathematical definitions to identify and construct examples.
CO3: Validate and critically assess a mathematical proof.
CO4: Use a combination of theoretical knowledge and independent mathematical thinking.
CO5: Reason from definitions to construct mathematical proofs.

19CSPE701 **GAME PROGRAMMING** **SEMESTER VII**

L	T	P	C
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COURSE OBJECTIVES:

- To understand the concepts of Game design and development.
- To learn the processes, mechanics and issues in Game Design.
- To expose the Core architectures of Game Programming.
- To know about Game programming platforms, frame works and engines.
- To learn to develop games.

9

UNIT-I: 3D GRAPHICS FOR GAME PROGRAMMING

Coordinate systems, Ray tracing, Modeling in game production, Vertex processing, Rasterization, Fragment processing and output merging, Illumination and shaders, Parametric curves and surfaces, Shader models, Image texturing, Bump mapping, Advanced texturing, Character animation, Physics-based simulation.

UNIT-II: GAME DESIGN PRINCIPLES **9**

Character development, Story telling, Narration, Game balancing, Core mechanics, Principles of level design, Genres of games, Collision detection, Game logic, Game AI, Path finding.

UNIT-III: GAMING ENGINE DESIGN **9**

Renderers, Software rendering, Hardware rendering and Controller based animation, Spatial sorting, Level of detail, Collision detection, Standard objects and physics.

UNIT-IV: GAMING PLATFORMS AND FRAMEWORKS **9**

Flash, DirectX, OpenGL, Java, Python, XNA with visual studio, Mobile gaming for the Android, iOS, Game engines - Adventure Game Studio, DX Studio, Unity.

UNIT-V: GAME DEVELOPMENT **9**

Developing 2D and 3D interactive games using Open GL, DirectX – Isometric and Tile Based Games, Puzzle games, Single player games, Multi-Player games.

Contact Periods:

Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**

REFERENCES:

1. David H. Eberly, "3D Game Engine Design, A Practical Approach to Real-Time Computer Graphics", 2nd Edition, 2006.
2. Jung Hyun Han, "3D Graphics for Game Programming", Chapman and Hall/CRC, 1st Edition, 2011.
3. Mike McShaffrfy, "Game Coding Complete", 3rd Edition, Charles River Media, 2009.
4. Jonathan S. Harbour, "Beginning Game Programming", Course Technology PTR, 3rd Edition, 2009.
5. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", Prentice Hall 1st Edition, 2006.
6. Roger E. Pedersen, "Game Design Foundations", 2nd Edition, Jones & Bartlett Learning, 2009.
7. Scott Rogers, "Level Up!: The Guide to Great Video Game Design", Wiley, 1st Edition,

2010.
8. Jason Gregory, “Game Engine Architecture”, A K Peters, 2009.
9. Jeannie Novak, “Game Development Essentials”, 3rd Edition, Delmar Cengage Learning, 2011.
10. Andy Harris, “Beginning Flash Game Programming For Dummies”, For Dummies; Updated Edition, 2005.
11. John Hattan, “Beginning Game Programming: A GameDev.net Collection”, 1st Edition, Course Technology PTR, 2009.
12. Eric Lengyel, “Mathematics for 3D Game Programming and Computer Graphics”, 3rd Edition, Course Technology PTR, 3rd Edition, 2011.
13. Dino Dini, “Essential 3D Game Programming”, Morgan Kaufmann, 1st Edition 2012.
14. Jim Thompson, Barnaby Berbank-Green and Nic Cusworth, “Game Design: Principles, Practice, and Techniques - The Ultimate Guide for the Aspiring Game Designer”, 1st Edition, Wiley, 2007.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Discuss the concepts of Game design and development.
CO2: Design the processes, and use mechanics for game development.
CO3: Explain the Core architectures of Game Programming.
CO4: Use Game programming platforms, frame works and engines.
CO5: Create interactive Games.

19CAPE001 **SOFT COMPUTING** **SEMESTER VII**

L	T	P	C
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COURSE OBJECTIVES:

- To learn the basic concepts of soft computing.
- To become familiar with soft computing techniques like neural networks.
- To Familiarize about fuzzy systems.
- To learn genetic algorithms.
- To apply soft computing techniques to solve problems.

UNIT-I: INTRODUCTION TO SOFT COMPUTING **9**

Introduction – Artificial intelligence – Artificial Neural Networks – Fuzzy systems – Genetic algorithm and evolutionary programming – Swarm intelligent systems – Classification of ANNS – Mcculloch and Pitts neuron model – Learning rules: Hebbian and Delta – Perceptron network – Adaline network – Madaline network.

UNIT-II: ARTIFICIAL NEURAL NETWORKS **9**

Back propagation neural networks – Kohonen neural network – Learning vector quantization – Hamming Neural network – Hopfield Neural network – Bi-directional Associative memory – Adaptive resonance theory neural networks – Support vector machines – Spike neuron models.

UNIT-III: FUZZY SYSTEMS **9**

Introduction to fuzzy logic, Classical sets and Fuzzy sets – Classical relations and Fuzzy relations – Membership functions – Defuzzification – Fuzzy arithmetic and Fuzzy measures – Fuzzy rule base and Approximate reasoning – Introduction to fuzzy decision making.

UNIT-IV: GENETIC ALGORITHMS **9**

Basic concepts – Working principles – Encoding – Fitness function – Reproduction – Inheritance operators – Cross over – Inversion and deletion – Mutation operator – Bit-wise operators – Convergence of Genetic algorithm.

UNIT-V: HYBRID SYSTEMS **9**

Hybrid systems – Neural networks, Fuzzy logic and Genetic – GA based weight determination – LR – Type fuzzy numbers – Fuzzy neuron – Fuzzy BP architecture – Learning in Fuzzy BP– Inference by Fuzzy BP – Fuzzy Art Map: A brief introduction – Soft computing tools – GA in Fuzzy logic controller design – Fuzzy logic controller.

Contact Periods:

Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**

REFERENCES:

1. Sivanandam S.N and Deepa S.N., "Principles of Soft Computing", Wiley India Pvt. Ltd., 2nd Edition, 2011.
2. Padhy N.P and Simon S.P., "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
3. Rajasekaran S and Vijayalakshmi Pai G.A., "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt. Ltd., 2017.
4. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2002.

5. Kwang H. Lee, “First course on Fuzzy Theory and Applications”, Springer, 2005.
6. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1996.
7. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Addison Wesley, 2003.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Apply various soft computing frame works.
CO2: Design of various neural networks.
CO3: Use fuzzy logic.
CO4: Apply genetic programming.
CO5: Discuss hybrid soft computing.

19CSPE703 **SERVICE ORIENTED ARCHITECTURE** **SEMESTER VII**

L	T	P	C
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COURSE OBJECTIVES:

- To learn fundamentals of XML.
- To provide an overview of Service Oriented Architecture.
- To be familiarize about web services and their importance.
- To learn web services standards and technologies.
- To learn service-oriented analysis and design for developing SOA based applications.

UNIT-I: INTRODUCTION TO XML **9**

XML document structure – Well-formed and valid documents – DTD – XML Schema – Parsing XML using DOM, SAX – XPath - XML Transformation and XSL – X Query.

UNIT-II: SERVICE ORIENTED ARCHITECTURE (SOA) BASICS **9**

Characteristics of SOA, Benefits of SOA, Comparing SOA with Client-Server and Distributed architectures – Principles of Service Orientation – Service layers.

UNIT-III: WEB SERVICES (WS) AND STANDARDS **9**

Web Services Platform – Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Service-Level Interaction Patterns – Orchestration and Choreography.

UNIT-IV: WEB SERVICES EXTENSIONS **9**

WS Addressing – WS Reliable Messaging – WS Policy – WS Coordination – WS Transactions – WS Security – Examples.

UNIT-V: SERVICE ORIENTED ANALYSIS AND DESIGN **9**

SOA delivery strategies – Service oriented analysis – Service Modelling – Service oriented design – Standards and composition guidelines – Service design – Business process design – Case Study.

Contact Periods:

Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**

REFERENCES:

1. Thomas Erl, “Service Oriented Architecture: Concepts, Technology and Design”, Pearson Education, 2005.
2. Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect's Guide”, Prentice Hall, 2004.
3. James McGovern, Sameer Tyagi, Michael E Stevens and Sunil Mathew, “Java Web Services Architecture”, Elsevier, 2003.
4. Ron Schmelzer et al. \ XML and Web Services., Pearson Education, 2002.
5. Frank P.Coyle, \XML, Web Services and the Data Revolution., Pearson Education, 2002
6. Thomas Erl, “Service Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2005.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Build applications based on XML.

CO2: Know the service orientation concepts, benefits of SOA.
CO3: Develop web services and WS standards.
CO4: Use web services extensions to develop solutions.
CO5: Apply service modeling, service oriented analysis and design for application development.

19CSPE704 MULTI-CORE ARCHITECTURE SEMESTER VII

L	T	P	C
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COURSE OBJECTIVES:

- To understand the need for multi-core processors and their architecture.
- To understand the challenges in parallel and multi-threaded programming.
- To learn about the various parallel programming paradigms.
- To develop multicore programs and design parallel solutions.

UNIT-I: MULTI-CORE PROCESSORS 9

Single core to Multi-core architectures – SIMD and MIMD systems – Interconnection networks – Symmetric and Distributed Shared Memory architectures – Cache coherence – Performance issues – Parallel program design.

UNIT-II: PARALLEL PROGRAM CHALLENGES 9

Performance – Scalability – Synchronization and data sharing – Data races – Synchronization primitives (Mutexes, Locks, Semaphores, Barriers) – Deadlocks and Livelocks – Communication between threads (Condition variables, Signals, Message queues and pipes).

UNIT-III: SHARED MEMORY PROGRAMMING WITH OpenMP 9

OpenMP Execution Model – Memory model – Open MP directives – Work-sharing constructs – Library functions – Handling data and Functional parallelism – Handling loops – Performance considerations.

UNIT-IV: DISTRIBUTED MEMORY PROGRAMMING WITH MPI 9

MPI program execution – MPI constructs – Libraries – MPI send and receive – Point-to-Point and Collective communication – MPI derived datatypes – Performance evaluation.

UNIT-V: PARALLEL PROGRAM DEVELOPMENT 9

Case studies – N-Body solvers – Tree search – Open MP and MPI implementations and comparison.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Peter S. Pacheco, "An Introduction to Parallel Programming", Morgan-Kauffman/Elsevier, 2011.
2. Darryl Gove, "Multicore Application Programming for Windows", Linux, and Oracle Solaris, Pearson, 2011 (unit 2).
3. Michael J Quinn, "Parallel programming in C with MPI and Open MP", Tata McGraw Hill, 2003.
4. Victor Alessandrini, "Shared Memory Application Programming", 1st Edition, Concepts and Strategies in Multicore Application Programming, Morgan Kaufmann, 2015.
5. Yan Solihin, "Fundamentals of Parallel Multicore Architecture", CRC Press, 2015.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Describe multicore architectures and identify their characteristics and challenges.
CO2: Identify the issues in programming parallel processors.
CO3: Write programs using Open MP and MPI.
CO4: Design parallel programming solutions to common problems.
CO5: Compare and contrast programming for serial processors and programming for parallel.

19CSPE705 HIGH PERFORMANCE COMPUTING SEMESTER VII

L	T	P	C
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COURSE OBJECTIVES:

- To introduce the concepts of Modern Processors.
- To introduce Optimization techniques for serial code.
- To introduce Parallel Computing Paradigms.
- To introduce Parallel Programming using MPI.
- To introduce Parallel Programming using OpenMP.

UNIT-I: MODERN PROCESSORS 9

Modern Processors: Stored program computer architecture – General purpose cache based microprocessor – Performance based metrics and benchmarks – Moore's Law – Pipelining – Super scalarity – SIMD – Memory hierarchies Cache – Mapping – Prefetch – Multicore processors – Multithreaded processors – Vector Processors – Design Principles – Maximum performance estimates – Programming for vector architecture. Intel Xeon, AMD, ARM, nVIDIA GPGPU, Intel KNL, OpenPower

UNIT-II: BASIC OPTIMIZATION TECHNIQUES FOR SERIAL CODE 9

Basic optimization techniques for serial code : Scalar profiling – Function and line based runtime profiling – Hardware performance counters – Common sense optimizations – Simple measures, large impact – Elimination of common sub expressions – Avoiding branches – Using SIMD Instruction sets – The role of compilers – General optimization options – Inlining – Aliasing – Computational accuracy – Register optimizations – Using compiler logs – C++ optimizations – Temporaries – Dynamic memory management – Loop kernels and iterators data access optimization: Balance analysis and light speed estimates – Storage order – Case study: Jacobi algorithm and dense matrix transpose.

UNIT-III: PARALLEL COMPUTERS 9

Parallel Computers : Taxonomy of parallel computing paradigms – Shared memory computers – Cache coherence – UMA – CCNUMA – Distributed – Memory computers – Hierarchical systems – Networks – Basic performance characteristics – Buses – Switched and fat – tree networks – Mesh networks – Hybrids – Basics of parallelization – Why parallelize – Data Parallelism – Function Parallelism – Parallel Scalability – Factors that limit parallel execution – Scalability metrics – Simple scalability laws – Parallel efficiency – Serial performance Vs Strong scalability – Refined performance models – Choosing the right scaling baseline – Case Study: Can slow processors compute faster – Load balance.

UNIT-IV: DISTRIBUTED MEMORY PARALLEL PROGRAMMING WITH MPI 9

Distributed memory parallel programming with MPI: Message passing – Introduction to MPI – example – Messages and point-to-point communication – Collective communication – nonblocking point-to-point communication – Virtual topologies – MPI parallelization of Jacobi solver – MPI implementation – performance properties.

UNIT-V: SHARED MEMORY PARALLEL PROGRAMMING WITH OPENMP 9

Shared memory parallel programming with OpenMp : Introduction to OpenMp – Parallel execution – Data scoping – OpenMp work sharing for loops – Synchronization – Reductions – Loop scheduling – Tasking – Case study: OpenMp – Parallel Jacobi algorithm – Advanced OpenMp wavefront parallelization – Efficient OpenMP programming: Profiling OpenMP

programs – Performance pitfalls – Case study: Parallel Sparse matrix –vector multiply.

Contact Periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Hager, Georg and Gerhard Wellein. "Introduction to high performance computing for scientists and engineers", CRC Press, 2010.
2. Ravikumar C. P., "High-Performance Cluster Computing. Volume 1: Architectures and Systems. Volume 2: Programming and Applications", Scalable Computing: Practice and Experience 2.4 (1999).
3. Wadleigh, Kevin R and Isom L. Crawford. "Software optimization for high-performance computing", Prentice Hall Professional, 2000.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Appreciate the concepts used in Modern Processors for increasing the performance.
CO2: Appreciate Optimization techniques for serial code.
CO3: Appreciate Parallel Computing Paradigms.
CO4: Identify the performance issues in Parallel Programming using OpenMP and MPI.
CO5: Develop a HPC application using OpenMP and MPI.

19CSPE706 **BIOINFORMATICS** **SEMESTER VII**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand basic concepts of molecular biology and genetics.
- To teach the concepts of computer science that relate to problems in biological sciences.
- To utilize computer as a tool for biomedical research.
- To gain important functional relationships from gene data.
- To give the overview of micro array technology.

UNIT-I: INTRODUCTION **9**

Need for Bioinformatics technologies – Overview of bioinformatics technologies structural bioinformatics – Data format and processing – Secondary resources and applications – Role of Structural bioinformatics – Biological data integration system.

UNIT-II: DATA WAREHOUSING AND DATA MINING IN BIOINFORMATICS **9**

Bioinformatics data – Data warehousing architecture – Data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics.

UNIT-III: MODELING FOR BIOINFORMATICS **9**

Hidden Markov modeling for biological data analysis – Sequence identification – Sequence classification – Multiple alignment generation – Comparative modeling – Protein modeling – Genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks – Molecular modeling – Computer programs for molecular modeling.

UNIT-IV: PATTERN MATCHING AND VISUALIZATION **9**

Gene regulation – Motif recognition – Motif detection – Strategies for Motif detection – Visualization – Fractal analysis – DNA walk models – One dimension – Two dimension – Higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.

UNIT-V: MICROARRAY ANALYSIS **9**

Microarray technology for genome expression study – Image analysis for data extraction – preprocessing – Segmentation – Gridding – Spot extraction – Normalization, Filtering – Cluster analysis – Gene network analysis – Compared evaluation of scientific data management systems – Cost matrix – Evaluation model – Benchmark – Tradeoffs.

Contact Periods:

Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**

REFERENCES:

1. Yi-Ping Phoebe Chen (Ed), "Bio Informatics Technologies", First Indian Reprint, Springer Verlag, 2007.
2. Zoe lacroix and Terence Critchlow, "Bio Informatics-Managing Scientific data", First Indian Reprint, Elsevier, 2004.
3. Bryan Bergeron, "Bio Informatics Computing", 2nd Edition, Pearson Education, 2003.
4. Arthur M. Lesk, "Introduction to Bioinformatics", 2nd Edition, Oxford University Press, 2005.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Basic concepts of molecular biology and genetics.

CO2: Comprehend the concepts of computer science that relate to problems in biological Sciences.

CO3: Usage of computer in biomedical research.

CO4: Compare pattern matching and visualization techniques.

CO5: Design and implement systems with micro array technology.

19CSPE707 DIGITAL IMAGE PROCESSING SEMESTER VII

L	T	P	C
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COURSE OBJECTIVES:

- To learn digital image fundamentals and be exposed to simple image processing techniques.
- To summarize the mathematical foundations of different image transformation concepts.
- To familiarize with image restoration and segmentation techniques.
- To explain the various compressions standards and interpret on image applications.
- To apply image processing techniques practically using MATLAB.

UNIT-I: DIGITAL IMAGE FUNDAMENTALS 9

Introduction – Origin – Steps in digital image processing – Components – Elements of visual perception – Image sensing and acquisition – Image sampling and quantization – Relationships between pixels – Color models.

UNIT-II: IMAGE ENHANCEMENT 9

Spatial Domain: Gray level transformations – Histogram processing – Basics of spatial filtering – Smoothing and sharpening spatial filtering – **Frequency Domain:** Introduction to Fourier transform – Smoothing and sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

UNIT-III: IMAGE RESTORATION AND SEGMENTATION 9

Noise models – Mean filters – Order statistics – Adaptive filters – Band reject filters – Band pass filters – Notch filters – Optimum notch filtering – Inverse filtering – Wiener filtering **Segmentation:** Detection of discontinuities – Edge linking and Boundary detection – Region based segmentation – Morphological processing – Erosion and dilation.

UNIT-IV: WAVELETS AND IMAGE COMPRESSION 9

Wavelets – Sub band coding – Multi-resolution expansions – **Compression:** Fundamentals – image compression models – Error free compression – Variable length coding – Bit-Plane coding – Lossless predictive coding – Lossy compression – Lossy predictive coding – Compression standards.

9

UNIT-V: DIGITAL IMAGE PROCESSING SIMULATION

Histograms equalization, Detection and recognition, Enhancement techniques, Image compression.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Rafael C. Gonzales and Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2010.
2. Rafael C. Gonzalez, Richard E. Woods and Steven L. Eddins, "Digital Image Processing Using MATLAB", 3rd Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
3. Anil Jain K., "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011.
4. Jayaraman S, Veerakumar T. and Esakkirajan S., "Digital Image Processing", 1st Edition,

McGraw Hill Education, 2009.
5. William K. Pratt, "Digital Image Processing", 4th Edition, John Wiley, New York, 2007.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Understand the digital image fundamentals and be exposed to simple image processing techniques.
CO2: Analyze the basic concept of different image transformation.
CO3: Summarize image restoration and segmentation techniques.
CO4: Explain the various compressions standards and interpret on image applications.
CO5: Apply image processing techniques practically using MATLAB.

19CSPE708 C# and .NET PROGRAMMING SEMESTER VII

L	T	P	C
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COURSE 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.
- To implement applications using .Net compact framework.

UNIT-I: INTRODUCTION TO C# 9

Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array class, Array list, String, String builder, Structure, Enumerations, Boxing and unboxing.

UNIT-II: OBJECT ORIENTED ASPECTS OF C# 9

Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

UNIT-III: APPLICATION DEVELOPMENT ON .NET 9

Building windows application, creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog box (Modal and Modeless), accessing data with ADO.NET, Dataset, typed dataset, Data Adapter, updating database using stored procedures, SQL server with ADO.NET, handling exceptions, validating controls, windows application configuration**.**

UNIT-IV: WEB BASED APPLICATION DEVELOPMENT ON .NET 9

Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web. config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL server.

UNIT-V: CLR AND .NET FRAMEWORK 9

Assemblies, Versoning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remoting, security in .NET

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

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.
3. Ian Gariffiths, Mathew Adams, Jesse Liberty, "Programming C# 4.0", O_Reilly, Fourth Edition, 2010.
4. Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework", Apress publication, 2012.
5. Andy Wigley, Daniel Moth, Peter Foot, "Mobile Development Handbook", Microsoft

Press, 2011.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: List the Basic elements of the .NET frame work.
CO2: Analyze the basic object oriented programming concepts structure of a C#.
CO3: Write various applications using C# Language in the .NET Framework.
CO4: Develop distributed applications using .NET Framework.
CO5: Create mobile applications using .NET compact Framework.

19CSPE709 SOFTWARE PROJECT MANAGEMENT SEMESTER VII

L	T	P	C
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COURSE OBJECTIVES:

- To understand the Software Project Planning and Evaluation techniques.
- To plan and manage projects at each stage of the software development life cycle (SDLC).
- To learn about the activity planning and risk management principles.
- To manage software projects and control software deliverables.
- To develop skills to manage the various phases involved in project management and people management.
- To deliver successful software projects that support organization‘s strategic goals.

UNIT-I: PROJECT EVALUATION AND PROJECT PLANNING 9

Importance of software project management – Activities – Methodologies – Categorization of software projects – Setting objectives – Management principles – Management control – Project portfolio management – Cost-benefit evaluation technology – Risk evaluation – Strategic program management – Stepwise project planning.

UNIT-II: PROJECT LIFE CYCLE AND EFFORT ESTIMATION 9

Software process and Process Models – Choice of Process models - Rapid Application development – Agile methods – Dynamic System Development method – Extreme programming – Managing interactive processes – Basics of software estimation – Effort and cost estimation techniques – COSMIC full function points – COCOMO II – A Parametric productivity model.

UNIT-III: ACTIVITY PLANNING AND RISK MANAGEMENT 9

Objectives of activity planning – Project schedules – Activities – Sequencing and scheduling – Network planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk planning –Risk Management – PERT technique – Monte carlo simulation – Resource allocation – Creation of critical paths – Cost schedules.

UNIT-IV: PROJECT MANAGEMENT AND CONTROL 9

Programming web application with web forms – ASP.NET introduction – Working with XML and .NET – Creating virtual directory and Web application – Session management techniques, web.config, Web services, Passing datasets – Returning datasets from web services – Handling transaction, Handling exceptions, Returning exceptions from SQL server.

UNIT-V: STAFFING IN SOFTWARE PROJECTS 9

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Bob Hughes, Mike Cotterell and Rajib Mall “Software Project Management”, 5th

Edition, Tata McGraw Hill, New Delhi, 2012.
2. Robert K. Wysocki, "Effective Software Project Management", Wiley Publication, 2011.
3. Walker Royce "Software Project Management", Addison-Wesley, 1998.
4. Gopalaswamy Ramesh, "Managing Global Software Projects", McGraw Hill Education (India), 14th Reprint 2013.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Apply Project Management principles while developing software.

CO2: Gain extensive knowledge about the basic project management concepts, framework and the process models.

CO3: Obtain adequate knowledge about software process models and software effort estimation techniques.

CO4: Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.

CO5: Learn staff selection process and the issues related to people management.

19CSPE710 HUMAN COMPUTER INTERACTION SEMESTER VII

L	T	P	C
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COURSE OBJECTIVES:

- To learn the foundations of Human Computer Interaction.
- To become familiar with design technologies for individuals and persons with disabilities.
- To be aware of mobile HCI.
- To learn the guidelines for user interface.

UNIT-I: FOUNDATIONS OF HCI 9

The Human: I/O channels – Memory – Reasoning and problem solving; The Computer: Devices – Memory – Processing and networks; Interaction: Models – Frameworks – Ergonomics – Styles – Elements – Interactivity – Paradigms – Case studies.

UNIT-II: DESIGN & SOFTWARE PROCESS 9

Interactive Design: Basics – Process – Scenarios – Navigation – Screen design – Iteration and prototyping. HCI in software process: Software life cycle – Usability engineering – Prototyping in practice – Design rationale. Design rules: Principles, Standards, Guidelines, Rules. Evaluation Techniques – Universal Design.

UNIT-III: MODELS AND THEORIES 9

HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models – Hypertext, Multimedia and WWW.

UNIT-IV: MOBILE HCI 9

Mobile Ecosystem: Platforms, Application frameworks – Types of mobile applications: Widgets, Applications, Games – Mobile information Architecture, Mobile 2.0, Mobile design: Elements of Mobile design, Tools – Case studies

UNIT-V: WEB INTERFACE DESIGN 9

Designing Web interfaces – Drag & Drop, Direct selection, Contextual tools, Overlays, Inlays and Virtual pages, Process flow – Case studies.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Alan Dix, Janet Finlay, Gregory Abowd and Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004.
2. Brian Fling, "Mobile Design and Development", 1st Edition, O'Reilly Media Inc., 2009.
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", 1st Edition, O'Reilly, 2009.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Design effective dialog for HCI.
CO2: Design effective HCI for individuals and persons with disabilities.
CO3: Assess the importance of user feedback.
CO4: Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
CO5: Develop meaningful user interface.

19CAHS004 PROFESSIONAL ETHICS IN ENGINEERING SEMESTER VIII

L	T	P	C
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COURSE OBJECTIVES:

- To understand the importance of Values and Ethics in their professional careers.
- To know the different ideas of engineering ethics.
- To Infer moral judgment concerning the profession.
- To inculcate the sense of social responsibility.
- To know the global issues of ethics.

UNIT-I: HUMAN VALUES 9

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 9

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.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S and Senthil Kumar V.S., “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.
3. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
4. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.

5. John R. Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
6. Edmund G. Seebauer and Robert L. Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Apply human values.
CO2: Apply ethical issues related to Engineering.
CO3: Realize the code of Ethics.
CO4: Realize the responsibilities and rights in the society.
CO5: Know Global Issues.

19CSPE802 NATURAL LANGUAGE PROCESSING SEMESTER VIII

L	T	P	C
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COURSE OBJECTIVES:

- To learn the fundamentals of natural language processing.
- To understand the use of CFG and PCFG in NLP.
- To understand the role of semantics of sentences and pragmatics.
- To apply the NLP techniques to IR applications.

UNIT-I: INTRODUCTION 9

Origins and challenges of NLP – Language modeling: Grammar-based LM, Statistical LM – Regular expressions, Finite-state Automata – English morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting spelling errors, Minimum edit distance.

UNIT-II: WORD LEVEL ANALYSIS 9

Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and backoff – Word classes, Part-of-speech tagging, Rule-based, Stochastic and transformation-based tagging, Issues in PoS tagging – Hidden Markov and maximum entropy models.

UNIT-III: SYNTACTIC ANALYSIS 9

Context-Free grammars, Grammar rules for English, Treebank's, Normal Forms for grammar – Dependency grammar – Syntactic parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic lexicalized CFGs – Feature structures, Unification of feature structures.

UNIT-IV: SEMANTICS AND PRAGMATICS 9

Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selectional restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods.

UNIT-V: DISCOURSE ANALYSIS AND LEXICAL RESOURCES 9

Discourse segmentation, Coherence – Reference phenomena, Anaphora resolution using Hobbs and Centering algorithm – Coreference resolution – Resources: Porter stemmer, Lemmatizer, Penn tree bank, Brill's tagger, Word Net, Prop Bank, Frame Net, Brown corpus, British National Corpus (BNC).

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Daniel Jurafsky and James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech", Pearson Publication, 2014.
2. Steven Bird, Ewan Klein and Edward Loper, "Natural Language Processing with Python", 1st Edition, O Reilly Media, 2009.
3. Breck Baldwin, "Language Processing with Java and Ling Pipe Cookbook", Atlantic Publisher, 2015.
4. Richard M. Reese, "Natural Language Processing with Java", OReilly Media, 2015.

5. Nitin Indurkhya and Fred J. Damerau, "Handbook of Natural Language Processing", 2nd Edition, Chapman and Hall/CRC Press, 2010.
6. Tanveer Siddiqui and Tiwary U.S., "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Tag a given text with basic Language features.
CO2: Design an innovative application using NLP components.
CO3: Implement a rule-based system to tackle morphology/syntax of a language.
CO4: Design a tag set to be used for statistical processing for real-time applications.
CO5: Compare and contrast the use of different statistical approaches for different types.

19CSPE803 INFORMATION SECURITY SEMESTER VIII

L	T	P	C
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COURSE OBJECTIVES:

- To provide an understanding of principal concepts, major issues, technologies and basic approaches in information security.
- To acquire knowledge on the legal, ethical and professional issues in Information Security.
- To understand the risk management schemes.
- To become aware of several standards.
- To see the technological aspects of information security.

UNIT-I: INTRODUCTION TO INFORMATION SECURITY 9

Information Security – History – Critical characteristics of information, NSTISSC security Model, Components of an information system, Securing the components, Balancing security and access, The SDLC, The security SDLC.

UNIT-II: SECURITY INVESTIGATION 9

Need for security, Business needs, Threats, Attacks, Legal, Ethical and Professional issues – Secure software development – An overview of computer security – Access control matrix, Policy – Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT-III: SECURITY ANALYSIS 9

Risk Management: Identifying and assessing risk, Assessing and controlling risk – Systems: Access Control Mechanisms, Information flow and Confinement problem.

UNIT-IV: LOGICAL DESIGN 9

Blueprint for security, Information Security policy, Standards and practices, ISO 17799/BS 7799, NIST models, VISA International Security Model, Design of security architecture, Planning for continuity.

UNIT-V: PHYSICAL SECURITY 9

Security technology, IDS, Scanning and analysis tools, Cryptography, Access control devices, Physical security: Physical vulnerability assessment – Choosing site location for security – Locks and entry controls – Physical intrusion detection.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Michael E. Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 2003
2. Micki Krause and Harold F. Tipton, “Handbook of Information Security Management”, Vol 1-3 CRC Press LLC, 2004.
3. Stuart McClure, Joel Scrambray and George Kurtz, “Hacking Exposed”, Tata McGraw Hill, 2003.
4. Matt Bishop, “Computer Security Art and Science”, Pearson/PHI, 2002.
5. Mark Rhodes Ousley “Information Security The Complete Reference” 2nd Edition, McGraw Hill Professional, 2013.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Acquire knowledge on the essentials of Information Security.
CO2: Identify threats and attacks to the information within systems.
CO3: Show the features of risk management.
CO4: Aware of several standards in information security.
CO5: Implement the security techniques and backup to ensure high availability of data.

19CSPE804 BUSINESS INTELLIGENCE SEMESTER VIII

L	T	P	C
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COURSE OBJECTIVES:

- To learn the fundamentals of business intelligence.
- To understand the different data analysis tools.
- To identify the good operating practices.
- To acquire knowledge through various case studies.
- To analyze the different applications.

UNIT-I: INTRODUCTION TO BUSINESS INTELLIGENCE 9

Effective and timely decisions, Data, information and knowledge, Role of mathematical models, Business intelligence architectures: Cycle of a business intelligence analysis; Enabling factors in business intelligence projects, Development of a business intelligence system, Ethics and business intelligence.

UNIT-II: KNOWLEDGE DELIVERY 9

Business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

UNIT-III: DATA ENVELOPMENT ANALYSIS 9

Efficiency measures, The CCR model: Definition of target objectives, Peer groups, Identification of good operating practices: cross efficiency analysis, Virtual inputs and outputs, Other models.

UNIT-IV: BUSINESS INTELLIGENCE APPLICATIONS 9

Marketing models, Logistic and Production models, Case studies.

UNIT-V: EMERGING BUSINESS INTELLIGENCE TRENDS 9

Search as Business Intelligence technique, Text analysis, Entity recognition and entity extraction, Sentiment analysis, Mobile business intelligence, Event stream processing, Embedded predictive analytic models, Big data analytics.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
2. David Loshin Morgan and Kaufman, "Business Intelligence: The Savvy Manager's Guide", 2nd Edition, 2012.
3. Larissa T. Moss and Atre S., "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
4. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.
5. Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App",

McGraw-Hill, 2007.
6. Ralph Kimball, Margy Ross, Warren Thornthwaite, Joy Mundy and Bob Becker, “The Data Warehouse Lifecycle Toolkit”, Wiley Publication Inc., 2007.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Describe the need for business intelligence.
CO2: Summarize different knowledge delivery methods.
CO3: Apply the various modelling techniques.
CO4: Outline the different business intelligence applications.
CO5: Explain the recent trends in business intelligence.

19CSPE805 AGILE METHODOLOGIES SEMESTER VIII

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COURSE OBJECTIVES:

- To comprehend various Agile methodologies.
- To understand the basic concepts of Agile software process.
- To Apply principles of Agile testing.
- To know the benefits and pitfalls of working in an Agile team.
- To understand agile development and testing.

UNIT-I: AGILE METHODOLOGIES 9

Theories for Agile management – Agile software development – Traditional model vs. Agile model – Agile development - Classification of Agile methods – Agile manifesto and principles Simple practices and project tools – Agile project management – Agile team interactions – Ethics in Agile teams - Agility in design, testing – Agile documentations – Agile drivers, Capabilities and values.

UNIT-II: AGILE SOFTWARE PROCESSES 9

Lean Production – SCRUM, Crystal, Feature driven development– Adaptive software development – Extreme programming: Method overview – Lifecycle – Work products, Roles and practices – Common mistakes and misunderstandings – Adoption strategies.

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.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

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

Computer Science", Springer, 2009.
3. Craig Larman, "Agile and Iterative Development: A Manager's Guide", Addison-Wesley, 2004.
4. Kevin C. Desouza, "Agile Information Systems: Conceptualization, Construction, and Management", Butterworth-Heinemann, 2007.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Gain knowledge in the area of various Agile methodologies.
CO2: Develop Agile software process.
CO3: Progress techniques and tools for educating team collaboration.
CO4: Execute Software process improvement as an ongoing task for development teams.
CO5: Show the uses of agile approaches in enterprise level.

19CSPE806 INFORMATION RETRIEVAL TECHNIQUES SEMESTER VIII

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the basics of Information retrieval.
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

UNIT-I: INTRODUCTION 9

Information retrieval – Early developments – The IR problem – The user's task – Information versus data retrieval – The IR system – The software architecture of the IR system – The retrieval and ranking processes – The Web – The e-Publishing era – How the web changed search – Practical issues on the Web – How people search – Search interfaces today – Visualization in search interfaces.

UNIT-II: MODELING AND RETRIEVAL EVALUATION 9

Basic IR models – Boolean model – TF-IDF (Term frequency/Inverse document frequency) Weighting – Vector model – Probabilistic model – Latent semantic indexing model – Neural Network model – Retrieval evaluation – Retrieval metrics – Precision and recall – Reference collection – User-based evaluation – Relevance feedback and Query expansion – Explicit relevance feedback.

UNIT-III: TEXT CLASSIFICATION AND CLUSTERING 9

A characterization of text classification – Unsupervised algorithms: Clustering – Naïve text classification – Supervised algorithms – Decision tree – k-NN Classifier – SVM classifier – Feature selection or dimensionality reduction – Evaluation metrics – Accuracy and error – Organizing the classes – Indexing and searching – Inverted indexes – Sequential searching – Multi-dimensional indexing.

UNIT-IV: WEB RETRIEVAL AND WEB CRAWLING 9

The Web – Search engine architectures – Cluster based architecture – Distributed architectures – Search engine ranking – Link based ranking – Simple ranking functions – Learning to rank – evaluations – Search engine ranking – Search engine user interaction – Browsing – applications of a Web crawler – Taxonomy – Architecture and implementation – Scheduling algorithms – Evaluation.

UNIT-V: RECOMMENDER SYSTEM 9

Recommender systems functions – Data and knowledge sources – Recommendation techniques – Basics of content-based recommender systems – High level architecture – Advantages and drawbacks of content-based filtering – Collaborative filtering – Matrix factorization models – Neighborhood models.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, "Modern Information Retrieval: The Concepts and Technology behind Search", 2nd Edition, ACM Press Books, 2011.
2. Ricci F, Rokach L, Shapira and Kantor B., "Recommender Systems Handbook", 1st

Edition, 2011.
3. Manning C, Raghavan P and Schütze H., "Introduction to Information Retrieval", Cambridge University Press, 2008.
4. Stefan Buettcher, Charles L.A. Clarke and Gordon V. Cormack, "Information Retrieval: Implementing and Evaluating Search Engines", The MIT Press, 2010.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Use an open-source search engine framework and explore its capabilities.
CO2: Use the models for evaluation
CO3: Apply appropriate method of classification or clustering.
CO4: Design and implement innovative features in a search engine.
CO5: Design and implement a recommender system.

19CSPE807 ROBOTICS AND ITS APPLICATIONS SEMESTER VIII

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To familiarize the Basics of robots.
- To understand Control system and end effectors.
- To familiarize Sensor technology.
- To familiarize Industrial application of robot.

UNIT-I: INTRODUCTION 9

Basic concepts – Robot anatomy – Manipulators – Kinematics: Forward and inverse kinematics – Precision movement, Robot specifications and work volume, Types of Robot drives – Basic Robot motions – Point to point control, Continuous path control.

UNIT-II: END EFFECTORS 9

End effectors – Classification – Mechanical, Magnetic, Vacuum and adhesive gripper – Gripper force analysis and design. Robot control, Unit control system concept – Servo and non-servo control of Robot joints, Adaptive and Optimal control.

UNIT-III: SENSORS 9

Sensor devices, Types of sensors – Contact, Position and displacement sensors, Force and torque sensors – Proximity and range sensors – Acoustic sensors – Robot vision systems – Sensing and digitizing – Image processing and analysis.

UNIT-IV: ROBOT PROGRAMMING 9

Robot language classification – Programming methods – Off and On-line programming – Lead through method – Teach pendent method – VAL systems and language, Simple program.

UNIT-V: INDUSTRIAL APPLICATIONS 9

Application of robots – Material handling – Machine loading and unloading, Assembly, Inspection, Welding, Spray painting, Mobile robot, Microbots – Recent developments in robotics – Safety considerations.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Deb S.R., “Robotics technology and flexible automation”, Tata McGraw Hill publishing company limited, New Delhi, 1994.
2. Mikel P. Groover, “Industrial Robotics Technology Programming and Applications”, Tata McGraw Hill publishing, Singapore, 1995.
3. Klafter R.D, Chmielewski, T.A and Noggins, “Robot Engineering: An integrated Approach”, Prentice Hall of India Pvt. Ltd., New Delhi, 1994.
4. Fu K.S, Gonealez R.C and Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, McGraw Hi 'Book Co., Singapore, 1987.
5. Craig J.J., “Introduction to Robotics Mechanics and Control”, Addison-Wesley, London. 1999.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Know about the basics of robotics.
CO2: Comprehend the control system for end effectors.
CO3: Awareness on sensors for robotics.
CO4: Develop robotic programming.
CO5: Develop robotic based applications.

19CAPE002 INTELLECTUAL PROPERTY RIGHTS SEMESTER VIII

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To give an idea about IPR.
- To understand registration of IPRs.
- To have knowledge on patents Act.
- To introduces the different aspects IP laws.
- To understand enforcement of IPRs.

UNIT-I: INTRODUCTION 9

Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – The way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, Technological Research, Inventions and Innovations – Important examples of IPR.

UNIT-II: REGISTRATION OF IPRs 9

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT-III: AGREEMENTS AND LEGISLATIONS 9

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT-IV: DIGITAL PRODUCTS AND LAW 9

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies.

UNIT-V: ENFORCEMENT OF IPRs 9

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Scople Vinod V., “Managing Intellectual Property”, Prentice Hall of India pvt Ltd, 2012.
2. Satakar S. V., “Intellectual Property Rights and Copy Rights”, Ess Publications, New Delhi, 2002.
3. Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets”, Cengage Learning, Third Edition, 2012.
4. Prabuddha Ganguli, “Intellectual Property Rights: Unleashing the Knowledge Economy”, McGraw Hill Education, 2011.
5. Derek Bosworth and Elizabeth Webster, “The Management of Intellectual Property”, Edward Elgar Publishing Ltd., 2013.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Ability to manage Intellectual Property portfolio to enhance the value of the firm.
CO2: Have Knowledge on different registration of IPRs.
CO3: Ability to recognize on patents Act.
CO4: Knowledge on different aspects IP laws.
CO5: Knowledge on enforcement of IPRs.

19CSPE809 MACHINE LEARNING TECHNIQUES SEMESTER VIII

L	T	P	C
3	0	0	3

COURSE 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 – Naive 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. 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

UNIT-V: ADVANCED LEARNING 9

History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks Convolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Tom M. Mitchel, “Machine Learning”, McGraw-Hill Education, India Private Limited, 2013.
2. Ethem Alpaydin, “Introduction to Machine Learning (Adaptive Computation and Machine Learning)”, The MIT Press 2004.
3. Stephen Marsland, “Machine Learning: An Algorithmic Perspective”, CRC Press, 2009.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Differentiate between supervised, unsupervised, semi-supervised machine learning approaches.

CO2: Discuss and apply the back-propagation algorithm and genetic algorithms to various problems.

CO3: Apply the Bayesian concepts to machine learning.

CO4: Use the latest trends in machine learning.

CO5: Analyze and suggest appropriate machine learning approaches for various types of problems.

19CSPE810 SOCIAL NETWORK ANALYSIS SEMESTER VIII

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the concept of semantic web and related applications.
- To learn knowledge representation using ontology.
- To understand human behavior in social web and related communities.
- To learn visualization of social networks.

UNIT-I: INTRODUCTION 9

Introduction to semantic web: Limitations of current web – Development of semantic web – Emergence of the social web – Social network analysis: Development of social network Analysis – Key concepts and measures in network analysis – Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities – Web-based networks – Applications of social network analysis.

UNIT-II: MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION 9

Ontology and their role in the semantic web: Ontology-based knowledge Representation – Ontology languages for the Semantic web: Resource Description Framework – Web Ontology language – Modelling and aggregating social network data: State-of-the-art in network data representation – Ontological representation of social individuals – Ontological representation of social relationships – Aggregating and reasoning with social network data – Advanced representations.

UNIT-III: EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS 9

Extracting evolution of web community from a series of web archive – Detecting communities in social networks – Definition of community – Evaluating communities – Methods for community detection and mining –Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities –Decentralized online social networks – Multi-relational characterization of dynamic social network communities.

UNIT-IV: PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES 9

Understanding and predicting human behavior for social communities – User data management – Inference and distribution – Enabling new human experiences – Reality mining – Context –Awareness – Privacy in online social networks – Trust in online environment – Trust models based on subjective logic – Trust network analysis – Trust transitivity analysis – Combining trust and reputation – Trust derivation based on trust comparisons – Attack spectrum and countermeasures.

UNIT-V: VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS 9

Graph theory – Centrality – Clustering – Node-edge Diagrams – Matrix representation – Visualizing online social networks, Visualizing social networks with matrix-based representations – Matrix and Node-link diagrams – Hybrid representations – Applications – Cover networks – Community welfare – Collaboration networks – Co-citation networks.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Peter Mika, "Social Networks and the Semantic Web", 1st Edition, Springer 2007.
2. Borko Furht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.
3. Guandong Xu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", 1st Edition, Springer, 2011.
4. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
5. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
6. John G. Breslin, Alexander Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Develop semantic web related applications.
CO2: Represent knowledge using ontology.
CO3: Comprehend extraction and mining algorithms.
CO4: Predict human behavior in social web and related communities.
CO5: Visualize social networks.

19CEOE01 GEOGRAPHICAL INFORMATION SYSTEM

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

- To introduce the fundamentals and components of Geographic Information System.
- To provide details of spatial data structures and input, management and output processes.

UNIT- I: FUNDAMENTALS OF GIS **9**

Introduction to GIS – Basic spatial concepts – Coordinate Systems – GIS and Information Systems – Definitions – History of GIS – Components of a GIS – Hardware, Software, Data, People, Methods – Proprietary and open source Software – Types of data – Spatial, Attribute data – Types of attributes – Scales/ levels of measurements.

UNIT- II: SPATIAL DATA MODELS **9**

Database Structures – Relational, Object Oriented – ER diagram – Spatial data models – Raster Data Structures – Raster Data Compression – Vector Data Structures – Raster vs Vector Models – TIN and GRID data models – OGC standards – Data Quality.

UNIT- III: DATA INPUT AND TOPOLOGY **9**

Scanner – Raster Data Input – Raster Data File Formats – Vector Data Input – Digitizer – Topology – Adjacency, Connectivity and containment – Topological Consistency rules – Attribute Data linking – ODBC – GPS – Concept GPS based mapping.

UNIT- IV: DATA ANALYSIS **9**

Vector Data Analysis tools – Data Analysis tools – Network Analysis – Digital Education models – 3D data collection and utilization.

UNIT- V: APPLICATIONS **9**

GIS Applicant – Natural Resource Management – Engineering – Navigation – Vehicle tracking and fleet management – Marketing and Business applications – Case studies.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Kang-Tsung Chang, "Introduction to Geographic Information Systems", McGraw Hill Publishing, 2nd Edition, 2011.
2. Ian Heywood, Sarah Cornelius, Steve Carver and Srinivasa Raju, "An Introduction to Geographical Information Systems", Pearson Education, 2nd Edition, 2007.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Have basic idea about the fundamentals of GIS.
CO2: Understand the types of data models.
CO3: Get knowledge about data input and topology.
CO4: Gain knowledge on data quality and standards.
CO5: Understand data management functions and data output.

19CEOE02	GREEN BUILDINGS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To introduce the different concepts of sustainable design and green building techniques and how they may be synthesized to best fit a specific construction project.

UNIT- I: INTRODUCTION **9**

Life Cycle impacts of materials and products – Sustainable design concepts – Strategies of Design for the Environment – The sun-earth relationship and the energy balance on the earth's surface, climate, wind – Solar radiation and solar temperature – Sun shading and solar radiation on surfaces – Energy impact on the shape and orientation of buildings – Thermal properties of building materials.

UNIT- II: ENERGY EFFICIENT BUILDINGS **9**

Passive cooling and day lighting – Active solar and photovoltaic – Building energy analysis methods - Building energy simulation – Building energy efficiency standards – Lighting system design – Lighting economics and aesthetics – Impacts of lighting efficiency – Energy audit and energy targeting – Technological options for energy management.

UNIT- III: INDOOR ENVIRONMENTAL QUALITY MANAGEMENT **9**

Psychrometry – Comfort conditions – Thermal comfort – Ventilation and air quality – Air-conditioning requirement – Visual perception – Illumination requirement – Auditory requirement – Energy management options – Air conditioning systems – Energy conservation in pumps – Fans and blowers – Refrigerating machines – Heat rejection equipment – Energy efficient motors – Insulation.

UNIT- IV: GREEN BUILDING CONCEPTS **9**

Green building concept – Green building rating tools – Leeds and IGBC codes – Material selection Embodied energy – Operating energy – Façade systems – Ventilation systems – Transportation – Water treatment systems – Water efficiency – Building economics.

UNIT- V: GREEN BUILDING DESIGN CASE STUDY **9**

Students to work through a controlled process of analysis and design to produce drawings and models of their own personal green building project. Topics include building form, orientation and site considerations; conservation measures; energy modeling; heating system and fuel choices; renewable energy systems; material choices; and construction budget – Case Study on green construction and design.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Kibert C., "Sustainable Construction: Green Building Design and Delivery", John Wiley & Sons, 2005.
2. Edward G. Pita, "An Energy Approach - Air - Conditioning Principles and Systems", Pearson Education, 2003.
3. Colin Porteous, "The New Eco–Architecture", Spon Press, 2002.

4. Energy Conservation Building Codes: www.bee–india.nic.in.
5. Lever More G J., "Building Energy Management Systems", E and FN Spon, London, 2000.
6. Ganesan T P., "Energy Conservation in Buildings", ISTE Professional Center, Chennai, 1999.
7. John Littler and Randall Thomas, "Design with Energy: The Conservation and Use of Energy in Buildings", Cambridge University Press, 1984.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Describe the concepts of sustainable design.
CO2: Familiarize with green building techniques including energy efficiency management.
CO3: Understand the indoor environmental quality management in green building.
CO4: Perform the green building rating using various tools.
CO5: Create drawings and models of their own personal green building project.

19CEOE03	PLANNING OF SMART CITIES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To have an exposure on development of smart cities considering various fields related and their challenges.

UNIT- I: SMART CITIES DEVELOPMENT POTENTIALS AND CHALLENGES **9**

Perspectives of smart cities: Introduction and overview – Implementation challenges – Methodological issues – Spatial distribution of startup cities – Re imagining post industrial cities – Implementation challenges for establishing smart urban information and knowledge management system.

UNIT- II: ROLE OF ICT, REMOTE SENSING, AND GEOGRAPHICAL INFORMATION SYSTEM **9**

Optimizing green spaces for sustainable urban planning – 3D city models for extracting urban environmental quality indicators – Assessing the rainwater harvesting potential – The strategic role of green spaces – Monitoring urban expansion.

UNIT- III: ENVIRONMENT, ENERGY, DISASTER MANAGEMENT AND SUSTAINABLE DEVELOPMENT **9**

Alternatives for energy stressed cities – Social acceptability of energy – Efficient lighting – Energy management – Urban dynamics and resource consumption – Issues and challenges of sustainable tourism – Green buildings: Eco-friendly technique for modern cities.

UNIT- IV: MULTIFARIOUS MANAGEMENT FOR SMART CITIES **9**

An Assessment of domestic water use practices – An issue of governance in urban water supply – Assessment of water consumption at urban household level – Water sustainability – Socio-economic determinants and reproductive healthcare system – Problems and development of slums.

UNIT- V: INTELLIGENT TRANSPORT SYSTEM **9**

Introduction to Intelligent Transportation Systems (ITS) – The range of ITS applications – Network optimization – Sensing traffic using virtual detectors - In-vehicle routing, and Personal route information – The smart car-commercial routing and delivery – Electronic toll collection – The smart card – Dynamic assignment – Traffic enforcement. urban Mobility and economic development.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCE:

1. Poonam Sharma and Swati Rajput, “Sustainable Smart Cities in India Challenges and Future Perspectives”, Springer 2017 Co.(P) Ltd. 2013.
2. Ivan Nunes Da Silva, “Rogerio Andrade Flauzino-Smart Cities Technologies” – ExLi4EvA, 2016.
3. Stan McClellan, Jesus A. Jimenez and George Koutitas (eds.), “Smart Cities Applications, Technologies, Standards, and Driving Factors”, Springer International

Publishing, 2018.
4. Stan Geertman, Joseph Ferreira, Jr. Robert Goodspeed and John Stillwell., “Planning Support Systems and Smart Cities” , Springer, 2015.

COURSE OUTCOME:

Upon completion of this course, the students will be able to:

CO1: Identify the potential and challenges in smart city development.
CO2: Apply the different tools for sustainable urban planning.
CO3: Understand the concepts of environment, energy and disaster management.
CO4: Identify the proper methods for water and waste water management.
CO5: Familiarize with the intelligent transport systems.

19CEOE04	VASTU SCIENCE FOR BUILDING CONSTRUCTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVE:

- To impart basic knowledge of Vastu science and its impact on human well being.

UNIT- I: INTRODUCTION **9**

Traditional definition – Meaning of Vastu and Vaastu - its classification – Relationship to earth – Concept of existence and manifestation – Placatory influence on earth.

UNIT- II: SPACE THEORY IN VASTU **9**

Features of good building site – Good building shapes – Macro, micro, enclosed and material spaces – Relationship between built space, living organism and universe – Impact of built space on human psyche. Flow of energy within built space and outside – Zoning of functional areas – Fitting of components in the building – Significance of water bodies and energy – The cube as the basic structure.

UNIT- III: COSMOGRAM & SETTLEMENT CONCEPTS **9**

Orientation of building, site, layout and settlement – Positive and negative energies – importance of cardinal and ordinal directions – The celestial grid or- mandala and its type. The Vaastu Purusha Mandala and its significance in creation of patterns, and lay-outs, extension of this to aural and visual fields.

UNIT- IV: INTERFACE OF TIME, VIBRATION AND RHYTHM **9**

Theory of vibration and energy transfer – Equation of time and space – Manifestation in living organism – Human beings – Measurement of the energy – Kirlian energy of various forms – Documentation of objects – Filaments and streamers.

UNIT- V: MEASUREMENTS & MATERIALS **9**

Units of measurement – Mana shastra – Ayadi techniques – Tala system and Hasta system of measures – Musical measurements compared to space measurements – Resultant ambience in built space. Use of wood, stone, metal, brick and time – Making technology, corbelling technology, jointing technology – Foundations for heavy and light structures – Landscaping in and around buildings – Aesthetic in Indian Architecture.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Dr. Prasanna Kumar Acharya, “Manasara”, Oxford1 University Press, (English version), 1927.
2. Subramanya Sastri K.S., “Maya Matam”, Thanjavur Maharaja Sarjoji Saraswathil Mahal Library, Thanjavur, 1966.
3. Stella Kramresh, “The Hindu Temple Vol.1 & II”, Motital Banarsidass Publishers Pvt. Ltd., Delhi, 1994.
4. Bruno Dagens, “ Mayamatam, Vol.1 & IIIGNCA and Motilal Bamarsidars Publishers Pvt. Ltd–s Delhi –1994.
5. George Birdsall – Feng Shui: The Key Concepts , January 2011.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Obtain exposure on various concepts of Vastu.

CO2: Understand the theories in Vastu.

CO3: Familiarize with the Cosmo gram and settlement concepts of Vastu.

CO4: Understand the role of Vasthu in energy flow manifestation in living beings.

CO5: Plan a structure considering various Vastu techniques.

19CEOE05 DISASTER MANAGEMENT AND MITIGATION

L	T	P	C
3	0	0	3

COURSE OBJECTIVE:

- To give knowledge about basics of disaster management.
- To impart knowledge about Hazards and Vulnerability.
- To give knowledge about mitigation and preparedness.
- To teach about response and recovery.
- To impart knowledge about the participants involved in the disaster management activity.

UNIT- I: INTRODUCTION **9**

Disaster throughout history, History of disaster management, Capacity by demand, UN International strategy for disaster reduction, The Hyogo framework for action, Post 2015 framework, Disaster trends.

UNIT- II: HAZARDS AND RISK VULNERABILITY **9**

Hazard identification and hazard profiling, Hazard analysis, Types of hazards – Natural and technological components of risk – Likelihood and consequence, Trends and computation of likelihood and consequence. Risk evaluation – purpose, Risk acceptability Alternatives, Personnel. Political/ social, Economic vulnerability – Physical profile, Social profile, Environmental profile, Economic profile. Factors influencing vulnerability, Risk perception.

UNIT- III: MITIGATION AND PREPAREDNESS **9**

Mitigation – Types of mitigation, Obstacles in mitigation, Assessment and selection of mitigation options, Emergency response capacity as incorporating mitigation into development and relief projects. Preparedness – Government preparedness, Public preparedness, Media as a public educator. Obstacles to public education and preparedness.

UNIT- IV: RESPONSE AND RECOVERY **9**

Response the Emergency – Pre disaster, post disaster, Provision of water, Food and shelter, Volunteer management, Command, Control and Coordination. Recovery – short term and long term recovery components of recovery – Planning, coordination, information, money and supplies, Allocation of relief funds, personnel. Types of recovery – Government, infrastructure, Debris removal disposal and processing, Environment, housing, economic and livelihood, individual, family and social recovery special considerations in recovery.

UNIT- V: PARTICIPANTS **9**

Governmental disaster management agencies – Fire, law, Emergency management, Emergency medical service, Military and other resources. Structures – Local, regional, National. Bilateral assistance and its types. Types of national agencies involved in international disaster management. Political implications of bilateral assistance. Nongovernmental organizations – Operations, NGO/ military coordination, standard of conduct. The role of private sector and academia. Multilateral organizations – UN agencies and programmers', Regional & International organizations. International financial institutions – The world bank, IMF, ADB, IADB. Special considerations.

Contact periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Brassard, Caroline, Giles, David W and Howitt, Arnold M., "Natural Disaster Management in the Asia–Pacific", Policy and Governance.
2. "Disaster Management", Global Challenges and Local Solutions, Universities Press, 2009.
3. Jack Pinkowski, "Disaster Management Handbook", CRC Press, January 22, 2008.
4. Disaster Management Guidelines, GOI–UNDP Disaster Risk Reduction Programme (2009 -2012).

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Get knowledge about basics of Disaster management.
CO2: Impact knowledge about Hazards and vulnerability.
CO3: Know about Mitigation and preparedness.
CO4: Attain knowledge about response and recovery.
CO5: Learn about the participants involved in the disaster management activity.

19CSOE06	OPEN SOURCE TECHNOLOGIES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To differentiate open source software and commercial software.
- To familiarize with Linux operating system.
- To develope web applications using open source web technologies like Apache, My Sql and PHP (LAMP/XAMP).

UNIT-I: OPEN SOURCE **9**

Introduction to Open Source – Open Source vs. Commercial Software – What is Linux? - Free Software – Where I can use Linux? Linux Kernel – Linux Distributions.

UNIT-II: LINUX **9**

Introduction to Linux Essential Commands - File system Concept - Standard Files - The Linux Security Model - Vi Editor - Partitions creation - Shell Introduction - String Processing - Investigating and Managing Processes - Network Clients – Installing Application.

UNIT-III: APACHE **9**

Apache Explained - Starting, Stopping, and Restarting Apache - Modifying the Default Configuration - Securing Apache - Set User and Group - Consider Allowing Access to Local Documentation - Don't Allow public html Web sites - Apache control with .htaccess.

UNIT-IV: MYSQL **9**

Introduction to MYSQL - The Show Databases and Table - The USE command - Create Database and Tables - Describe Table - Select, Insert, Update, and Delete statement - Some Administrative detail - Table Joins - Loading and Dumping a Database.

UNIT-V: PHP **9**

Introduction- General Syntactic Characteristics - PHP Scripting - Commenting your code - Primitives, Operations and Expressions - PHP Variables - Operations and Expressions Control Statement - Array - Functions - Basic Form Processing - File and Folder Access - Cookies - Sessions - Database Access with PHP - MySQL - MySQL Functions - Inserting Records - Selecting Records - Deleting Records - Update Records.

Contact Periods:

Lecture: 45 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 45 Periods**

REFERENCES:

1. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, OReilly Media, 2009.
2. James Lee and Brent Ware ,"Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", , Dorling Kindersley(India) Pvt. Ltd, 2008.
3. Eric Rosebrock, Eric Filson ,"Setting Up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons, 2004.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Differentiate the open source software and commercial software.

CO2: Identify, install and run Linux operating system.
CO3: Identify and install open source web technology Apache and manage applications.
CO4: Manage users and privileges in MySQL and to handle SQL functions.
CO5: Design and develop complete website using PHP.

19CSOE07	ETHICAL HACKING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand numerous methods of real-world information intelligence.
- To learn about vulnerability scanners.
- To understand techniques used to sniff traffic across a network.
- To familiarize with the methodologies that can be used to hack into a target.
- To appreciate the wide variety of attacks that can be performed against a wireless network.

UNIT-I: INTRODUCTION TO HACKING **9**

Terminologies, Categories of penetration test, Writing reports, Structure of a penetration Testing report, Vulnerability assessment summary, Risk assessment, Methodology, Linux basics: File structure, Cron Job, Users, Common applications, Back track, Services.

UNIT-II: INFORMATION GATHERING, TARGET ENUMERATION AND PORT SCANNING TECHNIQUES **9**

Active, Passive and sources of information gathering, Copying Websites locally, Neo Trace, Cheops-ng, Intercepting a response, What Web, Net craft, Basic parameters, Xcode Exploit scanner, Interacting with DNS servers, Fierce, Zone transfer with host command and automation, DNS Cache snooping – Attack scenario, Automating attacks, SNMP – Problem, Sniffing passwords, Solar winds Toolset, Sweep, Brute Force and Dictionary – Tools , Attack, Enumeration, Intelligence gathering using shodan, Target enumeration and Port scanning techniques.

UNIT-III: VULNERABILITY ASSESSMENT & NETWORK SNIFFING **9**

Introduction to vulnerability assessment – Pros and cons, NMap, Updation of database, Testing SCADA environments with Nmap, Nessus, Sniffing: Types, Hubs versus Switches, Modes, MITM attacks, ARP protocol basics – working, Attacks, DoS attacks, Dsniff tool, Using ARP spoof to perform MITM attacks, Sniffing the Traffic with Dsniff, Sniffing pictures with Drifnet, Urlsnarf and Webspy, Sniffing with Wireshark, Ettercap – ARP poisoning, Hijacking session with MITM attack, ARP poisoning with CAIN and Abel, Sniffing session Cookies with Wire shark, Hijacking the session, SSL strip: Stripping HTTPS traffic, Requirements, Automating man in the middle attacks, DNS spoofing, DHCP spoofing.

UNIT-IV: BASICS OF EXPLOITATION **9**

Remote exploitation : Understanding network protocols, Attacking network remote services, Common target protocols, Tools for cracking network remote services, Attacking SMTP, Attacking SQL servers, Client side exploitation methods: E-Mails leading to malicious attachments and malicious links, Compromising client side update, Malware loaded on USB sticks, Post exploitation: Acquiring situation awareness, Privilege escalation, Maintaining access, Data mining, Identifying and exploiting further targets, Windows exploit development basics.

UNIT-V: WIRELESS & WEB HACKING **9**

Wireless hacking : Requirements, Air cracking, Hidden SSIDs, Monitor mode, Monitoring tool – Beacon frames on Wire shark, Airodump-ng, Wireless adapter in monitor mode, Determining the target, Cracking a WPA/WPA2 wireless network Using Air cracking, Capturing packets and Four-Way handshake, Web hacking : Attacking the authentication,

Brute force and dictionary attacks, Types of authentication, Crawling restricted links, Testing for the vulnerability, Authentication bypass with insecure cookie handling, SQL Injection, XSS – DOM based, BeEF, CSRF, Bypassing CSRF and BeEF with XSS, Vulnerability in FCK editor, Efront.

Contact Periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Rafay Baloch, "Ethical Hacking and Penetration Testing Guide", CRC Press, 2015.
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Media, 2nd Revised Edition, 2013.
3. Michael T. Simpson, Kent Backman, James E. Corley, "Hands On Ethical Hacking and Network Defense", Cengage Learning, 2012.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Comprehend the basic concepts of hacking.
CO2: Know the core concepts related to malware, hardware and software vulnerabilities and their causes.
CO3: Recognize ethics behind hacking and vulnerability disclosure.
CO4: Appreciate the Cyber Laws and impact of hacking.
CO5: Exploit the vulnerabilities related to computer system and networks using state of the art tools and technologies.

19CSOE08	INTERNET OF THINGS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand smart objects and IoT architectures.
- To learn about various IoT-related protocols.
- To build simple IoT systems using Arduino and Raspberry Pi.
- To understand data analytics and cloud in the context of IoT.
- To develop IoT infrastructure for popular applications.

UNIT-I: FUNDAMENTALS OF IoT **9**

Evolution of internet of things –Enabling technologies – IoT architectures: oneM2M, IoT World Forum (IoTWF) and alternative IoT models – Simplified IoT architecture and core IoT functional stack – fog, Edge and cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart objects and Connecting smart objects.

UNIT-II: IOT PROTOCOLS **9**

IoT access technologies: Physical and MAC layers, topology and security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network layer: IP versions, Constrained nodes and constrained networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over low power and lossy networks – Application transport methods: Supervisory control and data acquisition – Application layer protocols: CoAP and MQTT.

UNIT-III: DESIGN AND DEVELOPMENT **9**

Design methodology – Embedded computing logic – Microcontroller, System on chips –IoT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi - Interfaces and raspberry Pi with Python programming.

UNIT-IV: DATA ANALYTICS AND SUPPORTING SERVICES **9**

Structured Vs Unstructured data and data in motion Vs data in rest – Role of machine learning – No SQL databases – Hadoop ecosystem – Apache Kafka, Apache spark – Edge streaming analytics and network analytics – Xively cloud for IoT, Python Web application framework – Django – AWS for IoT – System management with NETCONF – YANG.

UNIT-V: CASE STUDIES AND INDUSTRIAL APPLICATIONS **9**

Cisco IoT system – IBM Watson IoT platform – Manufacturing – Converged plant wide Ethernet model (CPwE) – Power utility industry – Grid blocks reference model – Smart and connected cities: Layered architecture, Smart lighting, Smart parking architecture and Smart traffic control.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things", Cisco Press, 2017.
2. Arshdeep Bahga and Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.

3. Olivier Hersent, David Boswarthick and Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012 .
4. Jan Ho ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand, David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
5. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), Architecting the Internet of Things, Springer, 2011.
6. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O’Reilly Media, 2011.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Explain the concept of IoT.
CO2: Analyze various protocols for IoT.
CO3: Design a PoC of an IoT system using Rasperry Pi/Arduino.
CO4: Apply data analytics and use cloud offerings related to IoT.
CO5: Analyze applications of IoT in real time scenario.

19CSOE09	SOFTWARE TESTING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the criteria for test cases.
- To learn the design of test cases.
- To understand test management and test automation techniques.
- To apply test metrics and measurements.

UNIT-I: INTRODUCTION **9**

Testing as an engineering activity – Testing as a process – Testing maturity model- Testing axioms – Basic definitions – Software testing principles – The tester's role in a software development organization – Origins of defects – Cost of defects – Defect classes – The defect repository and test design – Defect examples - developer/tester support of developing a defect repository.

UNIT-II: TEST CASE DESIGN STRATEGIES **9**

Test case design strategies – Using black box approach to test case design – Boundary value analysis – Equivalence Class partitioning – State based testing – Cause-effect graphing – Compatibility testing – User documentation testing – Domain testing - Random testing – Requirements based testing – Using white box approach to test design – Test adequacy criteria – Static testing vs. structural testing – Code functional testing – Coverage and control flow graphs – Covering code logic – Paths – Code complexity testing – Additional white box testing approaches- Evaluating test adequacy criteria.

UNIT-III: LEVELS OF TESTING **9**

The need for levels of testing – Unit test – Unit test planning – Designing the unit tests – The test harness – Running the unit tests and recording results – Integration tests – Designing integration tests – Integration test planning – Scenario testing – Defect bash elimination system Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Adhoc testing – Alpha, Beta tests – Testing OO systems – Usability and accessibility testing – Configuration testing –Compatibility testing – Testing the documentation- Website testing.

UNIT-IV: TEST MANAGEMENT **9**

People and organizational issues in testing – Organization structures for testing teams – Testing services – Test Planning – Test plan components – Test plan attachments – Locating test items – test management – test process – Reporting test results – Introducing the test specialist – Skills needed by a test specialist – Building a testing group- The structure of testing group, The technical training program.

UNIT-V: TEST AUTOMATION **9**

Software test automation – Skills needed for automation – Scope of automation – Design and architecture for automation – Requirements for a test tool – Challenges in automation – Test metrics and measurements – Project, Progress and Productivity metrics.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2006.
2. Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.
3. Iene Burnstein, "Practical Software Testing", Springer International Edition, 2003.
4. Edward Kit," Software Testing in the Real World – Improving the Process", Pearson Education, 1995.
5. Boris Beizer," Software Testing Techniques" , 2nd Edition, Van Nostrand Reinhold, New York, 1990.
6. Aditya P. Mathur, "Foundations of Software Testing Fundamental Algorithms and Techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Design test cases suitable for a software development for different domains.
CO2: Identify suitable tests to be carried out.
CO3: Prepare test planning based on the document.
CO4: Document test plans and test cases designed.
CO5: Use automatic testing tools, develop and validate a test plan.

19CSOE10	USER INTERFACE DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concepts user interface design.
- To design Menus and GUI.
- To understand the components of windows control.
- To visualize web controls.

UNIT-I: INTRODUCTION **8**

Human-Computer interface - Characteristics of graphics interface - Direct manipulation Graphical system - Web user interface – Popularity – Characteristic & principles.

UNIT-II: HUMAN COMPUTER INTERACTION **10**

User Interface design process - Obstacles – Usability - Human characteristics in design – Human Interaction speed - Business functions - Requirement analysis - Direct - Indirect methods - Basic business functions - Design standards - System timings - Human consideration in screen design - Structures of menus - Functions of menus - Contents of menu – Formatting - Phrasing the menu - Selecting menu choice - Navigating menus - Graphical menus.

UNIT-III: WINDOWS **9**

Characteristics - Components - Presentation styles - Types - Managements - organizations - Operations - Web systems - Device-based controls Characteristics - Screen-based controls - Operate control – Text boxes – Selection control - Combination control - Custom control – Presentation control.

UNIT-IV: MULTIMEDIA **9**

Text for web pages - Effective feedback - Guidance and Assistance - Internationalization - Accessibility – Icons - Image – Multimedia - Coloring.

UNIT-V: WINDOWS LAYOUT-TEST **9**

Prototypes - Kinds of tests – Retest – Information search - Hypermedia - WWW -Software tools -Visualizations to present and explore big data -Visualization of text data and protein sequences.

Contact Periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Wilbent O. Galitz,"The Essential Guide To User Interface Design", John Wiley & Sons, 2001.
2. Ben Sheiderman, "Design The User Interface", Pearson Education, 1998.
3. Alan Cooper, "The Essential of User Interface Design", Wiley Dream Tech, 2002.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Design the GUI components.
CO2: Design the Menu components.
CO3: Design the windows based controls.
CO4: Realize multimedia components.
CO5: Design windows layout for big data.

19ECOE11	AUTOMOTIVE ELECTROICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the concepts of Automotive Electronics and its evolution.
- To introduce overview of automotive systems and subsystems.
- To understand sensors and sensor monitoring mechanisms aligned to automotive systems, different signal conditioning techniques, interfacing techniques and actuator mechanisms.
- To understand, design and model various automotive control systems using Model based development technique.
- To understand role of Embedded in various communication systems, wired and wireless protocols used in vehicle networking.

UNIT-I: AUTOMOTIVE MECHANICAL SYSTEMS: VEHICLE SYSTEMS 9

Power train system (Air system, Fuel system (carburetor and diesel fuel injection, Ignition system, Exhaust system and other auxiliary systems (cooling, lubrications and electrical systems), Transmission system (Front, rear and 4 wheel drive, manual, automatic transmission, differential). Braking system (drum, disc, hydraulic, pneumatic), Steering system (rack and pinion, power steering).

UNIT-II: ELECTRONICS IN AUTOMOTIVE SYSTEMS 9

Need for electronics in automotive systems: Performance (speed, power, and torque), Control (emission, fuel economy, drivability, and safety) and legislation (environmental legislation for pollution and Safety Norms). Overview of vehicle electronic systems: Basic electrical components and their operation in an automobile: Power train subsystem (Starting systems, Charging systems – Ignition systems – Electronic fuel control), Chassis subsystem (ABS, TCS, and ESP) – Comfort and safety subsystems (Night vision, Airbags, Seatbelt Tensioners, Cruise control– Lane– Departure– Warning, Parking).

UNIT-III: INTEGRATED DEVELOPMENT ENVIRONMENT 9

Introduction to integrated development environment (IDE) – Getting started, HW / SW configuration (boot service, Host – Target interaction) – Booting reconfiguration – Managing IDE – Target servers, agents, Cross development, debugging – Introduction to an IDE for lab board – RTOS, PC based debugger.

UNIT-IV: EMBEDDED SYSTEM IN AUTOMOTIVE APPLICATIONS 9

Engine management systems – Gasoline / Diesel systems, various sensors used in system – Electronic transmission control – Vehicle safety system – Electronic control of braking and traction – Body electronics – Infotainment systems – Navigation systems – System level tests – Software calibration using engine and vehicle dynamometers – Environmental tests for electronic control unit – Application of control elements and control methodology in automotive system.

UNIT-V: EMBEDDED SYSTEM COMMUNICATION PROTOCOLS 9

Introduction to control networking – Communication protocols in embedded systems – SPI, I2C, USB – Vehicle communication protocols – Introduction to CAN, LIN, FLEXRAY, MOST, KWP2000.

Contact periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. JoergSchaeuffele, Thomas Zurawka, "Automotive Software Engineering Principles, Processes, Methods and Tools", SAE International, 2005.
2. Robert Bosch, "Automotive Handbook", John Wiley and Sons, 6th Edition, 2014. Denton. T., "Automobile Electrical and Electronic Systems", 4th Edition, 2012.
3. Ronald K. Jurgen, "Automotive Electronics Handbook", McGraw Hill Publications, 1999. Nicholas Navit, "Automotive Embedded System Handbook", CRC Press, Taylor and Francis Group, 2009.
4. Knowles D., "Automotive Electronic and Computer Controlled Ignition Systems", Prentice Hall, 1998.
5. William B. Ribbens, "Learning Automotive Electronics", Newnes Publishing, 6th Edition 2003.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Describe various mechanical systems in an automobile.
CO2: Illustrate different types of electronic systems in an automobile.
CO3: Outline the various stages of integrated development environment to design an embedded system.
CO4: Explain the various embedded systems used in automotive applications.
CO5: Compare Vehicle Communication Protocols.

19ECOE12	HARDWARE DESCRIPTIVE LANGUAGE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To impart the skill in various modeling in Verilog.
- To understand the basics of Verilog HDL.
- To learn the features in Verilog HDL.
- To understand the branching in Verilog,
- To be familiar with programming in digital circuits.

UNIT-I: OVERVIEW OF DIGITAL DESIGN WITH VERILOG HDL 9

Overview of Digital Design with Verilog HDL, Evolution of CAD, emergence of HDLs, typical HDL-flow, Trends in HDLs. Hierarchical Modeling Concepts Top-down and bottom-up design methodology, differences between modules and module instances, parts of a simulation, design block, stimulus block.

UNIT-II: BASIC CONCEPTS 9

Basic Concepts, Lexical conventions, data types, system tasks, compiler directives. Modules and Ports, Module definition, port declaration, connecting ports, hierarchical name referencing.

UNIT-III: GATE-LEVEL MODELING 9

Gate-Level Modeling - Modeling using basic Verilog gate primitives, description of and/or and buf/not type gates, rise, fall and turn-off delays, min, max, and typical delays. Dataflow Modeling, Continuous assignments, delay specification, expressions, operators, operands, operator types.

UNIT-IV: BEHAVIORAL MODELING 9

Behavioral Modeling, Structured procedures, initial and always, blocking and non-blocking statements, delay control, generate statement, event control, conditional statements, Multiway branching, loops, sequential and parallel blocks.

UNIT-V: LOGIC DESIGN USING VERILOG 9

Basic concepts – Identifiers – Procedural assignments – Design of combinational and sequential circuits using data flow – Structural gate level – Switch level modeling and behavioral modeling – Test benches.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Bhasker J., “Verilog HDL”, Prentice Hall, 2000.
2. Stephen Brown, “Fundamental of Digital logic with Verilog Design”, Tata McGraw Hill, 2008.
3. Samir Palnitkar, “Verilog HDL”, Pearson, 2nd Edition, 2003.
4. Zainalabedin Navabi, “Verilog digital systems design”, McGraw Hill, 2nd Edition, 1999.
5. Charles H Roth Jr., “Digital System Design using VHDL”, Thomson learning, 2004.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Understand the fundamentals of Verilog HDL.

CO2: Gain the knowledge about various modeling in Verilog HDL.

CO3: Be familiar with features in Verilog HDL.

CO4: Understand the fundamentals branching Verilog HDL.

CO5: Analyze the logic design using Verilog HDL.

19ECOE13	EMBEDDED SYSTEM DESIGN USING ARM PROCESSOR	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand ARM7TDMI assembly instructions and their formats and usage.
- To be very good in writing ARM7 based assembly level programs.
- To understand how various coprocessors are interfaced in a SoC.
- To be very conversant and knowledgeable in cache design, virtual memory and memory protection concepts and their implementation details in a typical SoC designs.
- To know about various families of ARM and different case studies.

UNIT-I: ARM ARCHITECTURE 9

Advanced RISC machine – Architecture inheritance – ARM programming model – ARM development tools – 3 and 5 stages pipeline ARM organization – ARM instruction execution and implementation – ARM Co-Processor interface.

UNIT-II: ASSEMBLY LANGUAGE PROGRAMMING 9

ARM instruction types – Data transfer, Data processing and control flow instructions – ARM instruction set – Co-processor instructions – Data processing instruction – Data transfer instruction – Control flow instructions.

UNIT-III: THE THUMB INSTRUCTION SET 9

Thumb bit in the CPSR – Thumb programmer‘s model – Thumb branch instructions – Thumb software interrupt instruction – Thumb data processing instructions – Thumb single register data transfer instructions – Thumb multiple register data transfer instructions – Thumb breakpoint instructions – Thumb implementation – Thumb applications.

UNIT-IV: MEMORY HIERARCHY 9

Memory size and speed – On-chip memory – Caches – Cache design – Memory management – Examples and exercises. Abstraction in software design – Date type – Floating point data type and architecture – Expressions – Conditional statement – Loops – Functions and procedures – Use of memory.

UNIT-V: ARM PROCESSOR AND CPU CORES. 9

ARM cores – ARM architecture – ARM7TDMI, ARM8, ARM9TDMI, ARM10TDMI, ARM710T – ARM810 – ARM920T AND ARM940T – ARM1020E – Case study.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Steve Furber, “ARM System on Chip Architecture‖ Addison”, Wesley Professional, 2nd Edition, Aug 2000.
2. Andrew N. Sloss, Dominic Symes and Chris Wright, “ARM System Developer‘s Guide Designing and Optimizing System Software”, Morgan Kaufmann Publishers, Elsevier, 2004.
3. Ricardo Reis, “Design of System on a Chip: Devices and Components”, Springer, 1st Edition, July 2004.
4. Jason Andrews-Co, “Verification of Hardware and Software for ARM System on Chip

Design (Embedded Technology)", Newnes, BK and CD– ROM (Aug 2004).
5. Rashinkar P., Paterson and Singh L., "System on a Chip Verification – Methodologies and Techniques", Kluwer Academic Publishers, 2001.
6. David Seal, "ARM Architecture reference Manual", Addison – Wesley Professional; 2nd Edition, 2001.
7. Alan Clement, "The principle of computer Hardware", 3rd Edition, Oxford University Press.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Explain ARM architecture.
CO2: Illustrate special features of ARM instruction set.
CO3: Make use of thumb instruction set to write assembly language program.
CO4: Explain memory and I/O management with ARM processor.
CO5: Review different ARM CPU cores.

19ECOE14 BIO-INSPIRED COMPUTING TECHNOLOGIES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the concept of Genetic algorithm.
- To learn the operators in Genetic algorithm.
- To understand the concept of PSO algorithm.
- To introduce advanced optimization algorithm.
- To know about hybrid optimization algorithm.

UNIT-I: INTRODUCTION **9**

Features of Evolutionary Computation – Advantages of Evolutionary Computation – Applications of Evolutionary Computation.

Genetic Algorithms: Introduction – Conventional Optimization and Search Techniques – Advantages and Limitations of Genetic Algorithm – Terminologies and Operators of GA

UNIT-II: OPERATORS AND APPLICATIONS **9**

Advanced Operators and Techniques in Genetic Algorithm – Classification of Genetic Algorithm – Application of GA in solving combinatorial optimization problems

UNIT-III: PSO ALGORITHM **9**

PSO Algorithm – Accelerated PSO – Implementation – Convergence Analysis – Binary PSO – Applications. Ant Colony Optimization – Characteristics- Algorithm –Applications.

UNIT-IV: ADVANCED OPTIMIZATION ALGORITHM **9**

Cuckoo Life Style – Flowchart – Algorithm , Bat Algorithm (Binary Bat Algorithm) – Echolocation of Bats – Flowchart – Algorithm, Bee-Inspired Algorithm (Artificial Bee Colony) – Flowchart – Algorithm

UNIT-V: HYBRID OPTIMIZATION ALGORITHM **9**

Teacher-Learner Based Optimization algorithm – Jaya Algorithm – Hybrid Optimization Algorithm: Hybrid Swarm Intelligence Optimization Algorithm.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Sivanandam S. N. and Deepa S.N., "Introduction to Genetic Algorithms", 1st Edition, Springer, USA, 2008.
2. OmidBozorg - Haddad, "Advanced Optimization by Nature-Inspired Algorithms", Springer, Volume 720, Singapore, 2018.
3. SrikantaPatnaik, Xin-She Yang and Kazumi Nakamatsu, "Nature-Inspired Computing and Optimization Theory and Applications", Springer, Volume 10,USA, 2017.
4. Nancy Arana-Daniel, Carlos Lopez-Franco, Alma Y Alanis, “Bio-inspired Algorithms for Engineering”, Butterworth-Heinemann 2018.
5. David E. Goldberg, “Genetic Algorithm in search, Optimization and Machine Learning” Pearson Education India, 2008.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Explain concept of Genetic algorithm.

CO2: Illustrate operators in Genetic algorithm.

CO3: Gain knowledge on the concept of PSO algorithm.

CO4: Explain the concepts on advanced optimization algorithm.

CO5: Review about hybrid optimization algorithm.

19ECOE15	VEHICULAR COMMUNICATION AND NETWORKING TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the vehicle-to-x (v2x) communication.
- To conceptualize standards and technologies.
- To understand the basics wireless propagation and channel characteristics. .
- To learn Medium access control (MAC). .
- To introduction to vehicular networks. .

UNIT-I: VEHICLE-TO-X (V2X) COMMUNICATION 9

Vehicle-to-X (V2X) Communication for Intelligent Transportation Systems (ITS) - safety and non-safety applications, use cases, network service requirements of different applications, V2X communication regimes.

UNIT-II: STANDARDS AND TECHNOLOGIES 9

Standards and Technologies - layered architecture, infrastructure-based vs. infrastructure-less technologies, Long-Term Evolution (LTE), Dedicated Short Range Communication (DSRC), Wireless Access in Vehicular Environments (WAVE).

UNIT-III: WIRELESS PROPAGATION AND CHANNEL CHARACTERISTICS 9

Wireless Propagation and Channel Characteristics - path loss, shadowing, small-scale fading, delay spread and Doppler spread, coherence bandwidth and coherence time, techniques for combating wireless channel impairments; Physical Layer - digital modulation schemes in DSRC, design of OFDM in DSRC (symbol time, sub-carrier spacing, pilot spacing).

UNIT-IV: MEDIUM ACCESS CONTROL (MAC) 9

802.11p EDCA, multi-channel operation in the WAVE MAC; Routing - flooding, broadcast storm problem, Geocast; Security and Privacy in Vehicular Networks; Vehicular Network Simulation - mobility models, bidirectionally coupled road traffic and communication network simulators for vehicular network simulation.

UNIT-V: INTRODUCTION TO VEHICULAR NETWORKS

Introduction to Vehicular Networks: Controller Area Networks (CAN) , Field of application, Physical layer and bit coding, Frame types and format, Bit stuffing and synchronization, Error management, Overview of Other communication protocols: LIN, Flex ray.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Christophe Sommer and Falko Dressler, “Vehicular Networking”, Cambridge University Press, 2014.
2. Hannes Hartenstein and Kenneth Laberteaux(eds.), “VANET Vehicular Applications and Inter-networking Technologies”, John Wiley & Sons, 2009.
3. Claudia Campolo, Antonella Molinaro and Riccardo Scopigno, “Vehicular ad hoc Networks: Standards, Solutions, and Research”, Springer, 2015.
4. Theodore S. Rappaport, “Wireless Communications: Principles and Practice”, Second Edition, Prentice Hall, 2001.

5. Andrea Goldsmith, “Wireless Communications”, Cambridge University Press, 2005.
6. Dominique Paret, “Multiplexed Networks for Embedded Systems: CAN, LIN, FlexRay, Safe–by–Wire”, First Edition, Wiley, 2007.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Define vehicle-to-x (v2x) communication.
CO2: Solve specific problems with standards and technologies.
CO3: Gain knowledge of the basics wireless propagation and channel characteristics**.**
CO4: Review on Medium Access Control (MAC).
CO5: Explain about vehicular networks.

19EEOE16 ENERGY EFFICIENT LIGHTING SYSTEM

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the importance of lightning.
- To known the fundamentals of illumination and its methods.
- To familiar lighting control methods for various applications.
- To understand energy efficient lighting in building management system.
- To study the renewable energy methods for energy efficient lighting.

UNIT I : LIGHTING **9**

Lighting - Importance of lighting in buildings - Interior designing, Photography, Architecture - Difference between good and bad lighting - Challenges in lighting - Types of lighting.

UNIT II : ILLUMINATION FUNDAMENTALS & VARIOUS ILLUMINATION METHODS **9**

Introduction - Terms used in illumination - Laws of illumination - Polar curves - Photometry - Integrating sphere - Sources of light - Discharge lamps - Incandescent lamps - MV and SV lamps.

UNIT III: ENERGY EFFICIENT LIGHTING **9**

Smart lighting - Fluorescent lamps - Comparison between Tungsten filament lamps and Fluorescent tubes - Basic principles of light control - Types and design of lighting and flood lighting - CFL - LED - High Intensity Discharge lamps.

UNIT IV: BUILDING MANAGEMENT SYSTEM **9**

Energy efficient landscape design - Natural lighting - Choice of building materials for energy efficient lighting - Light pipes - Light fixtures - Green buildings - Construction techniques.

9

UNIT V: CASE STUDY

Solar lighting techniques - Lighting using wind power - Energy conservation building code - Energy efficient buildings in the country.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Philip Gordon., "Principles and Practices of Lighting Design: The Art of Lighting Composition", Blue Matrix Productions, 2011.
2. Jerry Yudelson, "Green Building Through Integrated Design" The McGraw - Hill Companies, Inc., 2009.
3. Derek Phillips, "Daylighting: Natural Light in Architecture", Elsevier, 2004.
4. Jerry Yudelson , "Greening Existing Buildings", The McGraw - Hill Companies, Inc.,1st Edition, 2010.
5. Sam Kubba,"Handbook of Green Building Design and Construction", Elsevier Inc.,2012.
6. Solanki.C.S, "Solar Photovoltaic Technology and Systems", PHI, 2013.
7. J. F. Manwell, J.G. MC Gowan and A.L. Rogers, "Wind Energy Explained: Theory, Design and Application", Wiley, 2nd Edition, 2010.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to

CO1: Understand the properties of light, importance of lighting in various fields and types of lighting.

CO2: Understand the properties and laws of illumination, working of discharge lamps, fluorescent lamps, tungsten filament lamps and light control techniques.

CO3: Compare the various lighting techniques and employ suitable lighting control methods for various applications.

CO4: Choose the building materials and construction techniques for energy efficient lighting.

CO5: Employ renewable energy methods for energy efficient lighting.

19EEOE17	SENSORS AND TRANSDUCERS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the concepts of measurement technology.
- To learn the various motion, proximity and ranging sensors used to measure various physical parameters.
- To understand the various force, magnetic and heading sensors used to measure various physical parameters.
- To know the various optical, pressure and temperature sensors used to measure various physical parameters.
- To understand the fundamentals of signal conditioning, data acquisition and communication systems used in mechatronics system development.

UNIT I : INTRODUCTION **9**

Basics of measurement – Classification of errors – Error analysis – Static and dynamic characteristics of transducers – Performance measures of sensors – Classification of sensors – Sensor calibration techniques – Sensor output signal types.

UNIT II : MOTION, PROXIMITY AND RANGING SENSORS **9**

Motion sensors – Potentiometers, resolver, encoders – Optical, magnetic, inductive, capacitive, LVDT – RVDT – Synchro – Microsyn, accelerometer – GPS, bluetooth, Range sensors – RF beacons, Ultrasonic ranging, Reflective beacons, Laser range sensor (LIDAR).

UNIT III : FORCE, MAGNETIC AND HEADING SENSORS **9**

Strain gage, Load cell, Magnetic sensors – Types, principle, requirement and advantages: Magneto resistive – Hall effect – Current sensor, Heading sensors – Compass, gyroscope, inclinometers.

UNIT IV : OPTICAL, PRESSURE AND TEMPERATURE SENSORS **9**

Photo conductive cell, Photo voltaic, Photo resistive, LDR – Fiber optic sensors – Pressure – Diaphragm, bellows, Piezoelectric – Tactile sensors, Temperature – IC, thermistor, RTD, thermocouple. Acoustic Sensors – Flow and level measurement, Radiation sensors – Smart Sensors – Film sensor, MEMS & Nano sensors, LASER sensors.

UNIT V : SIGNAL CONDITIONING and DAQ SYSTEMS **9**

Amplification – Filtering – Sample and hold circuits – Data acquisition: single channel and multi-channel data acquisition – Data logging – Applications – Automobile, aerospace, Home appliances, Manufacturing, Environmental monitoring.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Ernest O. Doebelin, “Measurement Systems - Applications and Design”, Tata McGraw-Hill, 2009.
2. Sawney A K and Puneet Sawney, “A Course in Mechanical Measurements and Instrumentation and Control”, 12th Edition, Dhanpat Rai & Co, New Delhi, 2013.
3. Patranabis D., “Sensors and Transducers”, 2nd Edition, PHI, New Delhi, 2010.

4. John Turner and Martyn Hill, “Instrumentation for Engineers and Scientists”, Oxford SciencePublications, 1999.
5. Richard Zurawski, “Industrial Communication Technology Handbook” 2nd Edition, CRC Press, 2015.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to

CO1: Expertise in various calibration techniques and signal types for sensors.
CO2: Apply the various sensors in the automotive and mechatronics applications.
CO3: Study the basic principles of various magnetic sensors.
CO4: Study the basic principles of various smart sensors.
CO5: Implement the DAQ systems with different sensors for real time applications.

19EEOE18	ELECTRICAL SAFETY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To identify the presence of electrical hazards and measures to minimize risks.
- To determining the cause of electrical accidents, fires and explosions.
- To apply various grounding and bonding techniques.
- To adequate safety method for low, medium and high voltage equipment.
- To know the various fundamentals and provide solutions to a practical case study.

UNIT I : INTRODUCTION AND HAZARDS OF ELECTRICITY 9

Introduction – Hazard analysis: Primary and secondary hazards – Arc, blast, shocks – Causes and effects – Summary of causes – Protection and precaution – Injury and death protective strategies – IE Rules 1956 – Basic rules for new installations: Power system, domestic and industry (Qualitative treatment only).

UNIT II : ELECTRICAL SAFETY EQUIPMENT 9

General inspection and testing procedure for electrical safety equipment – Electrical safety equipment for external protection: Flash and thermal protection – Head and eye protection – Insulation protection. Electrical safety equipment for internal protection: Over voltage, short circuit, earth fault, leakage current, high/low frequency – Single line diagram of industrial power system with safety control – Electrician's safety kit and materials.

UNIT III : SAFETY PROCEDURES 9

Introduction – Six-step safety method – Job briefings – Energized or De-energized – Safe switching of power systems – General energy control programs – Lockout – Tag out – Voltage measurement techniques – Placement of safety grounds – Flash hazard calculations and approach distances – Calculating the required level of arc protection (flash hazard calculations) – Barriers and warning signs – Tools and test equipment – Field marking of potential hazards – Shock avoidance techniques – One-minute safety audit.

UNIT IV : GROUNDING AND ELECTRICAL MAINTENANCE 9

Need for electrical equipment grounding – System grounding – Equipment grounding – Types of Earthing – Earth testing for electrical equipment's in power house and industry – Eight step maintenance program – Maintenance requirements for specific equipment and location – IEC and UL standard.

UNIT V : VOLTAGE SAFETY SYNOPSIS AND MEDICAL SAFETY MANAGEMENT 9

Safety equipment's and safety procedures for low voltage and high voltage system – Electrical safety around electronic circuits – Electrical safety for medical equipment like over current safety, isolation, EMI and harmonics – Battery maintenance procedure – Stationary battery safety – Accident prevention – Accident investigation – First aid – Rescue techniques – Electrical safety program structure and development – Safety meetings – Safety audits.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. John Cadick, Mary Capelli-Schellpfeffer and Dennisneitzel, “Electrical Safety Handbook”, Mcgraw Hill Publishing Company Ltd., 4th Edition, 2012.
2. Dennis Neitzel and Al Winfield, “Electrical Safety Handbook”, McGraw – Hill Education, 4th Edition, 2012.
3. Mohamed A El-Sharkawi, “Electric safety: Practice and Standards”, CRC press, New York, 2013.
4. Martha J. Boss and Gayle Nicoll, “Electrical Safety: Systems, Sustainability and Stewardship”, CRC press, New York, 2014.
5. Ray A. Jones and Jane G. Jones, “The Electrical Safety Program Guide”, National fire protection association, Quincy, 2011.
6. James H and Wiggins JR., “Managing Electrical Safety”, Abs Consulting, Maryland, 2011.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to

CO1: Expand skills in identifying the presence of electrical hazards, implementing measures to minimize risks.

CO2: Develop skills in investigative techniques for determining the cause of electrical accidents, fires and explosions.

CO3: Analyze and apply various grounding and bonding techniques.

CO4: Select appropriate safety method for low, medium and high voltage equipment.

CO5: Assess and provide solutions to a practical case study.

19EEOE19	ELECTRIC VEHICLES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the basics of electric vehicle components and configuration.
- To analyze suitable drive scheme for developing an electric trains.
- To analyze energy storage system.
- To identify a energy management system.
- To understand the infrastructure for electric vehicles and business potential.

UNIT I : INTRODUCTION **9**

Conventional vehicles: Basics of vehicle performance, Vehicle power source characterization, Transmission characteristics and mathematical models to describe vehicle performance. Introduction to hybrid electric vehicles: History of hybrid and electric vehicles, Social and environmental importance of hybrid and electric vehicles, Impact of modern drive-trains on energy supplies. Hybrid electric drive-trains: Basic concept of hybrid traction, Introduction to various hybrid drive-train topologies, Power flow control in hybrid drive-train topologies, Fuel efficiency analysis.

UNIT II : ELECTRIC TRAINS **9**

Electric drive-trains: Basic concept of electric traction, introduction to various electric drive train topologies, Power flow control in electric drive-train topologies, fuel efficiency analysis. Electric propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC motor drives, Induction motor drives, permanent magnet motor drives, switch reluctance motor drives – Drive system efficiency.

UNIT III : ANALYSIS OF ENERGY STORAGE **9**

Energy storage: Introduction to energy storage requirements in hybrid and electric vehicles, Battery based energy storage and its analysis, Fuel cell based energy storage and its analysis, super capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, Sizing the power electronics, Selecting the energy storage technology, Communications, supporting subsystems.

UNIT IV : ENERGY MANAGEMENT STRATEGIES **9**

Introduction to energy management strategies used in hybrid and electric vehicles, Classification of different energy management strategies, Comparison of different energy management strategies, implementation issues of energy management strategies.

UNIT V : BUSINESS PERSPECTIVE OF ELECTRIC VEHICLE **9**

Design of a hybrid electric vehicle (HEV) – Design of a battery electric vehicle (BEV), hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles. Business: E-mobility business, electrification challenges, Connected mobility and autonomous mobility – Case study: E-mobility Indian roadmap perspective. Policy: EVs in infrastructure system, integration of EVs in smart grid, Social dimensions of EVs.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Mehrdad Ehsani, Yimin Gao, Sebatien Gay and Ali Emadi, “Modern Electric, Hybrid Electric and Fuel cell vehicles: Fundamentals, Theory and Design”, CRC press, 2004.
2. Mi C, Masrur M A and Gao D W., “Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives”, John Wiley & Sons, 2017.
3. Onori S, Serrao L and Rizzoni G., “Hybrid Electric Vehicles: Energy Management Strategies”, Springer, 2015.
4. Sandeep Dhameja, “Electric Vehicle Battery Systems”, Butterworth - Heinemann, 2002.
5. Ronald K. Jurgen, “Electric and Hybrid - Electric Vehicles”, SAE, 2010.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to

CO1: Understand the basics of electric vehicle components and configuration.
CO2: Analyze suitable drive scheme for developing an electric vehicle.
CO3: Analyze a proper energy storage system.
CO4: Opt a proper energy management system.
CO5: Understand the infrastructure for electric vehicles and business potential.

19EEOE20	SCADA SYSTEM AND APPLICATION MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To acquire knowledge about the SCADA system.
- To provide knowledge about the SCADA components.
- To grasp knowledge about SCADA communication.
- To understand the concepts of SCADA monitoring and control.
- To understand the concepts of SCADA application in power system.

UNIT I : INTRODUCTION TO SCADA **9**

Evolution of SCADA, SCADA definitions, SCADA functional requirements and components, SCADA hierarchical concept, SCADA architecture, General features, SCADA applications, benefits.

UNIT II : SCADA SYSTEM COMPONENTS **9**

Remote terminal unit (RTU), Interface units, human-machine interface units (HMI), Display monitors/data logger systems, Intelligent electronic devices (IED), Communication network, SCADA server, SCADA control systems and control panels.

UNIT III : SCADA COMMUNICATION **9**

SCADA communication requirements, Communication protocols: Past, present and future, structure of a SCADA communications protocol, Comparison of various communication protocols, IEC61850 based communication architecture, Communication media like fiber optic, PLCC etc. Interface provisions and communication extensions, Synchronization with NCC, DCC.

UNIT IV : SCADA MONITORING AND CONTROL **9**

Online monitoring the event and alarm system, Trends and reports, Locking list, Event disturbance recording. Control function: Station control, Bay control, Breaker control and disconnector control.

UNIT V : SCADA APPLICATIONS IN POWER SYSTEM **9**

Applications in generation, Transmission and distribution sector, Substation SCADA system functional description, System specification, system selection such as substation configuration, IEC61850 ring configuration, SAS cubicle concepts, Gateway interoperability list, Signal naming concept. System installation, Testing and commissioning.

Contact Periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Stuart A. Boyer, "SCADA-Supervisory Control and Data Acquisition", Instrument Society of America Publications, USA, 2016.
2. Gordon Clarke, Deon Reynders, "Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems", Newnes Publications, Oxford, UK, 2004.
3. William T. Shaw, "Cybersecurity for SCADA Systems", PennWell Books, 2006.
4. David Bailey and Edwin Wright, "Practical SCADA for Industry", Newnes, 2003.
5. Michael Wiebe, "A guide to utility automation: AMR, SCADA, and IT Systems for

Electric Power", PennWell 1999.
6. Dieter K. Hammer, Lonnie R. Welch and Dieter K. Hammer, "Engineering of Distributed Control Systems", Nova Science Publishers, USA, 1st Edition, 2002.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Understand the concepts of SCADA system.
CO2: Acquire knowledge about the SCADA components.
CO3: Acquire knowledge about SCADA communication.
CO4: Understand the concepts of SCADA monitoring and control.
CO5: Understand the concepts of SCADA application in power system.

19MEOE21	TESTING OF MATERIALS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To apply knowledge of mechanics of materials for designing mechanical elements including design process, failure prevention under static & variable loadings.

UNIT I: INTRODUCTION 6

Strength of materials – Basic assumptions – Elastic and plastic behavior – Average stress and strain – Concept of stress, Strain and the types of stresses and strains.

UNIT II: PLASTIC DEFORMATION OF CRYSTALS 9

Deformation by slip – Slip in a perfect lattice – Slip by dislocation movement – Critical resolved shear stress for slip – Deformation of single crystals – Polycrystalline materials – Deformation by twinning, stacking faults, strain hardening.

UNIT III: FRACTURE MECHANICS AND HARDNESS TESTING 12

Types of fracture, Griffith theory and modified Griffith – Orowan theory, metallographic aspects of fracture, crack propagation, concept of fracture curve. Concept of fracture curve – Fracture toughness KIC Testing. R-curve, J-Integral, drop weight test – Brinell hardness testing, Rockwell hardness testing, Vickers hardness testing and knoop hardness testing, Nano indentation, Problems.

UNIT IV: TENSION TESTING 9

ASTM Standards and specification, Engineering stress & strain, True stress strain curves, Holloman – Ludwig equation – Plastic Instability (Necking) – Testing machines – Types, testing procedures, Properties measured, Specimen dimensions, Problems.

UNIT-V: TORSION, SHEARING AND IMPACT TEST 9

ASTM Standards and specification Testing Machines and procedures. Impact testing: Principle – Izod and Charpy Impacts tests, ASTM Standards and specification. Ductile to Brittle Transition Temperature (DBTT), Factors affecting DBTT – Determination of DBTT.

Contact periods:

Lecture: 45 Periods Lecture: 45 Periods Lecture: 45 Periods Lecture: 45 Periods

REFERENCES:

1. George E. Dieter, “Mechanical Metallurgy” 3rd Edition, Mc Graw Hill, 2013.
2. Hull D and Bacon D J., “Introduction to dislocations”, Butterworth Heinemann, Oxford, 2001.
3. Wullf et al, Vol. III “Mechanical Behavior of Materials", John Wiley and Sons, New York,1983.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Understand the static force and inertia forces and their effect that exist in materials.
CO2: Perform balancing, vibration and critical speeds with respect to material.
CO3: Understand the standards, concepts and terminology of material testing.
CO4: Select the appropriate measuring device based on measuring requirements.
CO5: Gain knowledge regarding impacts and testing of materials.

19MEOE22	ROBOTICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To understand the functions of the basic components of a robot.
- To study the use of various types of end effectors and sensors.
- To impart knowledge in robot kinematics and programming.
- To learn robot safety issues and economics.

UNIT I: FUNDAMENTALS OF ROBOT 9

Robot – Definition – Robot anatomy – Coordinate systems, Work envelope, Types and classification – Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of motion, Pay load – Robot parts and their functions – Need for robots – Different applications.

UNIT II: ROBOT DRIVE SYSTEMS AND END EFFECTORS 9

Pneumatic drives – Hydraulic drives – Mechanical drives – Electrical drives – D.C. Servo motors, Stepper motors, A.C. Servo motors – Salient features, Applications and comparison of all these drives, End effectors – Grippers – Mechanical grippers, Pneumatic and hydraulic grippers, Magnetic grippers, Vacuum grippers; Two fingered and Three fingered grippers; Internal grippers and external grippers; Selection and design considerations.

UNIT III: SENSORS AND MACHINE VISION 9

Requirements of a sensor, Principles and Applications of the following types of sensors – Position sensors – Piezo electric sensor, LVDT, Resolvers, Optical encoders, Pneumatic position sensors, Range sensors – Triangulations principles, Structured, Lighting approach, Time of flight, Range finders, Laser range meters, Touch sensors, Binary sensors., Analog sensors, Wrist sensors, Compliance sensors, Slip sensors, Camera, Frame grabber, Sensing and Digitizing image data – Signal conversion, Image storage, Lighting techniques, Image processing and analysis – Data deduction, Segmentation, Feature extraction, Object recognition, Other algorithms, Applications – Inspection, Identification, Visual serving and navigation.

UNIT IV: ROBOT KINEMATICS AND ROBOT PROGRAMMING 9

Forward kinematics, Inverse kinematics and Difference; Forward kinematics and Reverse kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of Freedom (in 3 Dimension) Jacobians, Velocity and Forces – Manipulator dynamics, Trajectory generator, Manipulator mechanism design – Derivations and Problems. Lead through programming, Robot programming languages – VAL Programming – Motion commands, Sensor commands, End effectors commands and Simple programs.

UNIT-V: IMPLEMENTATION AND ROBOT ECONOMICS 9

RGV, AGV; Implementation of robots in industries – Various steps; Safety considerations for robot operations – Economic analysis of robots.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Groover M P., “Industrial Robotics – Technology Programming and Applications”, McGraw Hill, 2012.
2. Klafter R D., Chmielewski T A and Negin M., “Robotic Engineering - An Integrated Approach”, Prentice Hall, 2003.
3. Craig JJ. “Introduction to Robotics Mechanics and Control”, Pearson Education, 2008.
4. Deb S R., “Robotics Technology and Flexible Automation” Tata McGraw Hill Book Co., 2013.
5. Fu.KS, Gonzalz R C and Lee C S G., “Robotics Control, Sensing, Vision and Intelligence”, McGraw Hill Book Co., 1987.
6. Janakiraman P.A., “Robotics and Image Processing”, Tata McGraw Hill, 1995.
7. Koren Y., “Robotics for Engineers", Mc Graw Hill Book Co., 1992.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Explain the concepts of industrial robots, classification, specifications and coordinate systems. Also summarize the need and application of robots in different sectors.

CO2: Illustrate the different types of robot drive systems as well as robot end effectors.

CO3: Apply the different sensors and image processing techniques in robotics to improve the ability of robots.

CO4: Develop robotic programs for different tasks and familiarize with the kinematics motions of robot.

CO5: Examine the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.

19MEOE23	INDUSTRIAL ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To assume Technical and Managerial roles in the Industries.
- To apply Engineering Principles to the working environment.
- To use quality tools to foresee and solve issues in the industrial situations.
- To work collaboratively.

UNIT I: FORECASTING **9**

Characteristics and principles – Qualitative methods, Delphi technique, Market research – Time series methods – Moving average, Exponential smoothing, Box Jenkins method – Autoregressive moving average (ARMA) or autoregressive integrated moving average (ARIMA) models – Fitting regression models – Measurement of forecast errors, Coefficient of correlation – Problem solving.

UNIT II: FACILITIES PLANNING AND WORK STUDY **9**

Factors affecting site location decisions – Principles and types of layout – Layout planning – Layout tools and computerized layout techniques – Design of group technology layout – Line balancing – Line balancing methods – Objectives of work study – Method study procedure, Recording techniques – Motion study – Principles of motion Economy – Techniques of work measurement – Time study – Synthesis method – Analytical estimating – Predetermined Motion Time System (PMTS) – Work sampling techniques.

UNIT III: LEAN MANUFACTURING **9**

Elements of Just In Time (JIT) – Pull and push system, Kanban system – Optimized production technology and synchronous manufacturing – Implementation of Six sigma – Single Minute Exchange of Die (SMED) 5S concept – Concurrent engineering – Cellular manufacturing – Enablers of agile manufacturing – Rapid manufacturing - Business Process Reengineering (BPR) – Enterprises Resources Planning (ERP) – Role of KAIZEN, Quality circles and POKA YOKE in modern manufacturing – Seven wastes in lean manufacturing.

UNIT IV: AGGREGATE PRODUCTION PLANNING **9**

Objectives of aggregate planning – Capacity Requirement Planning (CRP) process – Types of capacity planning – Strategies for aggregate capacity planning – Master production scheduling – Procedure for developing MPS – Materials Requirements Planning (MRP-I), Issues in MRP, Designing and Managing the MRP System, Evaluation of MRP – Manufacturing Resources Planning (MRP-II).

UNIT-V: SCHEDULING OF OPERATIONS **9**

Operations planning and scheduling – Scheduling techniques – Stages in scheduling – Loading, dispatching, Expediting – Finite loading and infinite loading – Load charts and machine loading charts – Priority sequencing – Dynamic sequencing rules – Batch scheduling – Economic Batch Quantity (EBQ) or Economic Run Length (ERL) – Scheduling in repetitive, Batch and job shop manufacturing – Allocation of units for a single resource, Allocation of multiple resources – Resource balancing - Flexible manufacturing system.

Contact periods:
Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Panneerselvam R., "Production & Operations Management", 3rd Edition, PHI Learning Private Limited, New Delhi, 2012.
2. Elwood S. Buffa, and Rakesh K. Sarin, "Modern Production/Operation Management", 8th Edition, John Wiley & Sons, 2000.
3.Dilworth B. James, "Operations Management Design, Planning and Control for Manufacturing and Services", Mcgraw Hill Inc., New York, 1992.
4. Vollman TE., "Manufacturing Planning and Control Systems", Galgotia Publications, 2002.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Apply the knowledge of Engineering and Sciences to improve the productivity of industries.
CO2: Design a system to meet the desired needs within realistic constraints.
CO3: Function in multidisciplinary teams.
CO4: Use the techniques, skills, and modern Engineering tools in manufacturing practice.
CO5: Perform as an effective industrial Engineer integrating high and low levels of management.

19MEOE24	MARKETING MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To impart elementary knowledge to the students regarding the various aspects of sales management.

UNIT I: SALESMANSHIP **9**

Meaning, Definition, Characteristics, Concept, Kinds, Nature – Evolution, and psychology in selling, Scope, Limitations and importance – Sales management: meaning, definition, Characteristics, Principles, Functions and importance, Difference between sales management and marketing management.

UNIT II: SALESMAN **9**

Types, Qualities, Objectives, Duties and responsibilities of good salesman, Recruitment, selection and training of salesman: Sources of recruitment, Principles of selection, Selection procedure, Meaning, Advantages, Disadvantages, Methods, Principles and limitation, Subject matter and Types of good training programme.

UNIT III: REMUNERATION/ COMPENSATION **9**

Essentials of Good Remuneration Plan, Objectives – Methods, Factors determining Remuneration Plan, Comparative study of various plans. Motivating sales force: Meaning, Definition, Objectives, Importance and methods.

UNIT IV: SALES PLANNING **9**

Meaning, Components, Elements, Types, Importance and limitations, Sales fields or territories: Meaning, Definition, Objectives, Factors determining Size, Allocation of sales territories, Steps in setting sales territories. Sales quota: Meaning, Definition, Objectives, Factors determining sales quota, Methods of determining sales quota, Types, Principles of successful sales quota, Advantages and disadvantages of sales quota.

UNIT-V: CONSUMER BEHAVIOUR **9**

Meaning, Definition, Variables and factors affecting Consumer behaviour – Buying Motives: Meaning, Kinds, Chief buying motives – Different types of consumers – Behaviour and customer service.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Santoki, “Sales Management”, Kalyani Publisher.
2. Gupta S L., “Sales and Distribution Management”, Excel Books, New Delhi, 2008.
3. Still R and Richard, “Sales Management”, Pearson Prentice Hall, Delhi.
4. Schiffman, Kanuk and Kumar, “Consumer Behaviour”, Pearson, 10th Edition.
5. Kotler and Keller, “Marketing Management”, Pearson Publication.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Understand the concepts for salesmanship.

CO2: Developed knowledge of salesman responsibilities.

CO3: Understand the concepts for remuneration and compensation methods.

CO4: Developed knowledge of sales planning techniques.

CO5: Understand the use of consumer behavior concepts.

19MEOE25	ENERGY CONSERVATION AND MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study about the energy data, energy accounting and balancing of industries.

UNIT I: INTRODUCTION **9**

Energy – Power – Past & present scenario of world; National energy consumption data – Environmental aspects associated with energy utilization – Energy auditing: Need, Types, Methodology and barriers. Role of energy managers. Instruments for energy auditing.

UNIT II: ELECTRICAL SYSTEMS **9**

Components of EB billing – HT and LT supply, Transformers, Cable sizing, Concept of capacitors, Power factor improvement, Harmonics, Electric motors – Motor efficiency Computation, Energy efficient motors, Illumination – Lux, Lumens, Types of lighting, Efficacy, LED lighting and scope of Encon in illumination.

UNIT III: THERMAL SYSTEMS **9**

Stoichiometry, Boilers, Furnaces and thermic fluid heaters – Efficiency computation and Encon measures. Steam: Distribution & usage: Steam traps, Condensate recovery, Flash steam utilization, Insulators & refractories.

UNIT IV: ENERGY CONSERVATION IN MAJOR UTILITIES **9**

Pumps, Fans, Blowers, Compressed air systems, Refrigeration and air conditioning Systems – Cooling towers – D.G. sets.

UNIT-V: ECONOMICS **9**

Energy economics – Discount rate, Payback period, Internal rate of return, Net present Value, Life cycle costing – ESCO concept.

Contact periods:

Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods

REFERENCES:

1. Witte LC, Schmidt P S and Brown D R., "Industrial Energy Management and Utilisation", Hemisphere Publ, Washington, 1988.
2. Callaghn P W., "Design and Management for Energy Conservation", Pergamon Press, Oxford, 1981.
3. Energy Manager Training Manual (4 Volumes) available at www.energymanager training.com, a website administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India, 2004.
4. Dryden I G C., "The Efficient Use of Energy", Butterworths, London, 1982.
5. Turne W C., "Energy Management Hand book", Wiley, New York, 1982.
6. Murphy W R and Mc KAY G., "Energy Management", Butterworths, London 1987.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Understand the significance and procedure for energy conservation and audit.

CO2: Analyze, Calculate and Improve the energy efficiency and performance of electrical

utilities.

CO3: Analyze, Calculate and Improve the energy efficiency and performance of thermal utilities.

CO4: Analyze, Calculate and Improve the energy efficiency and performance of mechanical utilities.

CO5: Carry out the energy accounting and balancing.

19CSVAX01 ANDROID APPLICATION DEVELOPMENT

L	T	P	C
1	0	0	1

COURSE OBJECTIVES:

- To know about the android architecture.
- To understand the building environment of the android
- To understand layout and activity of the android.

UNIT-I: INTRODUCTION TO THE ANDROID WORLD 3

Android Architecture**,** IO's Vs Android**,** Scope as an Android App Developer**,** Understanding Eclipse IDE, API Levels

UNIT-II: BUILDING ENVIRONMENT FOR ANDROID 3

Basic programming languages intro: Java and XML, Front-End and Back-End environment, Designing Front-end through XML, Designing Backend through JAVA, Practicing various design Layouts

UNIT-III: UNDERSTANDING LAYOUTS 3

Layouts and Widgets, Working with various layouts: Linear, Relative, Table, Frame**,** Working with various Widgets: Text-View, Edit-Text, Buttons, Image-Views, and Scroll View**,** Practicing Layout Nesting's on various Layouts, Weight-sum and Gravity

UNIT-IV: GETTING FAMILIAR WITH ACTIVITY 3

Activity and its Life-Cycle, Designing an Activity, Practicing its Life-Cycle, Manifest File, Registering the Activity in Manifest File, Setting up the Android Virtual Device, Testing your Hello World Application

UNIT-V: INTRODUCTION TO INTENTS AND APPLICATIONS 3

Intents, Types of Intents: Explicit and Implicit, Starting another Activity using both types of Intents, Bundles, Sending Data from one Activity to another, Building Camera application, fetching image using Intent, Understanding various Notifications, Toast, Dialog and Alert-Dialog, Action-bar Notification. Splash Screen Application, Music Player Application, SMS Application, Camera Application, Email Application, Text-To-Speech Application

Contact Periods:

Lecture: 15 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 15 Periods

REFERENCES:

1. Dawn Griffiths & David Griffiths, Head First Android Development, O`Reilly, 2nd Edition, 2016.
2. Michael Burton, Android App Development for Dummies, Wiley`s, 3rde Edition, 2015.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Use the android architecture.
CO2: Build environment of the android
CO3: Design layout and activity of the android.

19CSVAX02	MULTIMEDIA SYSTEMS	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To know about the multimedia system design, File handling and three dimensional concepts.

UNIT-I: MULTIMEDIA SYSTEMS DESIGN **5**

Multimedia basics − Multimedia applications − Multimedia system architecture − Evolving technologies for multimedia − Defining objects for multimedia systems − Multimedia data interface standards − Multimedia databases.

UNIT-II: MULTIMEDIA FILE HANDLING **5**

Compression and decompression − Data and file format standards − Multimedia I/O technologies − Digital voice and audio − Video image and animation − Full motion video − Storage and retrieval technologies.

UNIT-III: THREE-DIMENSIONAL CONCEPTS **5**

Three-Dimensional object representations − Three-Dimensional geometric and modeling transformations − Three-Dimensional viewing − Hidden surface elimination − Color models – Virtual reality – Animation.

Contact Periods:

Lecture: 15 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 15 Periods

REFERENCES:

1. A P Godse, D A Godse, Computer Graphics & Multimedia Paperback – First Edition 2014
2. D. P. Mukherjee, Fundamentals of Computer Graphics and Multimedia, Second Edition 1998

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Design Multimedia Applications.
CO2: Handle multimedia files.
CO3: Create three dimensional animations.

19CSVAX03	SOFTWARE TESTING TOOLS	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To know about the testing techniques and test administration.
- To develop test case using tools.

UNIT-I: INTRODUCTION **3**

The Multiple Roles of the Software Tester (People Relationships), Scope of Testing, Testing Constraints, Life Cycle Testing, Independent Testing

UNIT-II: TESTING TECHNIQUES **4**

Structural versus Functional Technique Categories, Verification versus Validation, Static versus Dynamic Testing, Examples of Specific Testing Techniques

UNIT-III: TEST ADMINISTRATION **3**

Test Planning, Customization of the Test Process, Budgeting, Scheduling, Create the test Plan

UNIT-IV: TEST CASE AND TOOLS **5**

Test case Design., Building test cases, Test data mining, Test execution, Test Reporting, Defect Management, Factors for choosing a particular tool, An overview for the major functional testing tools, Overview of Test management and bug tracking tools

Contact Periods:

Lecture: 15 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 15 Periods**

REFERENCES:

1. Ron Patton, Software Testing, 2nd Edition, 2005
2. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, Fourth Edition

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Validate testing techniques.

CO2: Plan the and customize the test administration.

CO3: Create test case and use tools.

19CSVAX 04	CISCO NETWORKING	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To know about the routing and switching essentials.
- To understand scaling networks.
- To develop connecting networks.

UNIT-I: INTRODUCTION TO NETWORK **3**

Exploring the Network, Configuring a Network Operating System, Network Protocols and Communications, Network Access, Ethernet, Network Layer, Transport Layer ,IP Addressing, Subnetting IP Networks, Application Layer, It's a Network

UNIT-II: ROUTING AND SWITCHING ESSENTIALS **4**

Introduction to Switched Networks, Introduction to Switched Networks, VLANs, Routing Concepts, Inter-VLAN Routing, Static Routing, Routing Dynamically, Single-Area OSPF Access Control Lists, DHCP, Network Address Translation for IPv4

UNIT-III: SCALING NETWORKS **3**

Introduction to Scaling Networks, LAN Redundancy, Link Aggregation, Wireless LANs, Adjust and Troubleshoot Single-Area OSPF, Multiarea OSPF, Enhanced Interior Gateway Protocol (EIGRP), EIGRP Advanced Configurations and Troubleshooting, IOS Images and Licensing

UNIT-IV: CONNECTING NETWORKS **5**

Hierarchical Network Design, Connecting to the WAN, Point-to-Point Connections, Frame Relay, Network Address Translation for IPv4, Broadband Solutions, Securing Site-to-Site Connectivity, Monitoring the Network, Troubleshooting the Network

Contact Periods:

Lecture: 15 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 15 Periods**

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. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Know routing and switching essentials.

CO2: Design scaling networks.

CO3: Design connecting networks.

19CSVAX 05	.NET PROGRAMMING	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To learn basic programming in C# and the object oriented programming concepts.
- To update and enhance skills in writing Windows applications.
- To implement applications using .Net compact framework.

UNIT-I: INTRODUCTION **3**

Introductions, course mechanics, .NET Overview, CLR, Assemblies (monolithic vs. component-based applications), Execution Model, Client-Side vs. Server-Side Programming, Web Technologies

UNIT-II: .NET INTEROPERATION SERVICES **4**

HTML, JavaScript, CSS, jQuery, OpenDesigns, Introduction to C#: Types and program structure, Development Environment Setup, ISS, SQL Server and Visual Studio, Advanced C#: OOP, Delegates, Events, Attributes, unsafe code, .NET Intero

UNIT-III: .NET DATA ACESS **3**

Databases and Data Access using ADO.NET & LINQ, Introduction to ASP.NET, programming model, server controls, data binding.

UNIT-IV: ASP .NET **5**

Introduction to ASP.NET, programming model, server controls, data binding, ASP.NET state management, tracing, caching, error handling, security, deployment, user and custom controls, DotNetNuke

Contact Periods:

Lecture: 15 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 15 Periods**

REFERENCES:

1. Pro C# with .NET 3.0, Andrew Troelsen, Apress, 2007, ISBN 978-1-59059-823-8
2. Microsoft Windows SharePoint Services 3.0 Step by Step, Olga Londer, Todd Bleeker, Penelope Coventry, James Edelen, Microsoft Press, 2005, ISBN-10: 0735623635
3. Microsoft .NET XML Web Services: Step by Step, Adam Freeman, Allen Jones, Microsoft Press, 2003, ISBN 0-7356-1720-1
4. Microsoft .NET Distributed Applications: Integrating XML Web Services and .NET Remoting, Matthew MacDonald, ISBN 0-7356-1933-6.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Develop programs in C#.

CO2: Design .NET data classes.

CO3: Develop ASP.NET programs.

19CSVAX06	NODE JS & ANGULAR JS	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To learn basic of HTML and CSS.
- To develop java script.
- To implement angularjs and nodejs.

UNIT-I: INTRODUCTION TO HTML & CSS **2**

HTML Basics, Elements, Attributes, Styles, Input Attributes, File Paths, Script tag, CSS, Introduction, Syntax, Selectors, Styling, Pseudo class, Pseudo Element.

UNIT-II: JAVA SCRIPT **5**

HTML, JavaScript, CSS, jQuery, OpenDesigns, Introduction to C#: Types and program structure, Development Environment Setup, ISS, SQL Server and Visual Studio, Advanced C#: OOP, Delegates, Events, Attributes, unsafe code, .NET Intero

UNIT-III: ANGULARJS **3**

Features of AngularJS, Model-View-Controller, My First AngularJS app, Angular Expressions, Built-In Filters, Using Angular JS Filters, Role of a Controller, Controllers & Modules

UNIT-IV: NODE JS **5**

SwingAnimate Module, CSS Transforms, Introduction to Node JS, Advantages of Node JS, InstallNode.js on Windows

Contact Periods:

Lecture: 15 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 15 Periods

REFERENCES:

1. Simon Holmes, Getting MEAN with Mongo, Express, Angular, and Node.
2. Fernando Monteiro, AngularJS Directives Cookbook.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Create java script.
CO2: Know angularjs.
CO3: Know nodejs.

19CSVAX07	VIRTUAL MACHINE FUNDAMENTALS	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To learn about virtual machines.
- To develop program for virtual machines
- To know about architecture of virtualization.

UNIT-I: INTRODUCTION **2**

Core Concept - Examples - Types - Economics of Virtualizing - Use Cases - Key Technical Challenges.

UNIT-II: SYSTEM VIRTUAL MACHINES **5**

Core System Architecture - Virtualization Vs Emulation - Virtualizing/Emulating CPU - Memory - and Peripherals - Key Problems and Solutions - Instruction Set Mapping and Translation - Managing Translated Code - Defining the Boundaries - Dealing with Control Transfers - Handling Dynamic Code Changes - Program Switching - Self Modifying Codes - Pre-translation - Pause and Resume - System Snapshot - Techniques and Practices - Applications - Influence of Economics an Design Choices - Case Study: Microsoft Device Emulator.

UNIT-III: PROGRAM VIRTUAL MACHINES **5**

Roles - Architecture - Mapping to the Base (System) Architecture - Key Problems and Solutions - JIT Compilation - Data Structure Mapping - Memory Management – Sandboxing - Exceptions - Semantic Issues - Type Safety - Language Intrinsics - Internal Management Structures - Influence of Economics on Design Choices - Case Study: CLR.

UNIT-IV: HARDWARE ARCHITECTURE EVOLUTION AND ROLE OF VIRTUALIZATION **3**

Definitions – Representation of Graphs – Traversal- Topological sort – Shortest Path Algorithms: Dijkstra's Algorithm – Network Flow Problem – Minimum Spanning Tree: Prim's and Kruskal's algorithm.

Contact Periods:

Lecture: 15 Periods **Tutorial: 0 Periods** **Practical: 0 Periods** **Total: 15 Periods**

REFERENCES:

1. Jim Smith and Ravi Nair, Virtual Machines: Versatile Platforms for Systems and Processes, Morgan Kaufmann Publishers, USA, 2007.
2. Iain D Craig, Virtual Machines, Springer Publishers, USA, 2005.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Recognize virtual machine.

CO2: Develop programs for virtual machines.

CO3: Identify the role of virtualization.

19CSVAX 08	SOFTWARE PRODUCT DEVELOPMENT AND MANAGEMENT	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To learn about product planning and development.
- To perform sales and marketing.
- To know about product service support.

UNIT-I: INTRODUCTION AND FOUNDATION **2**

Introduction to Software Product Development Methodology -Phases -Roles - Responsibilities.

UNIT-II: PRODUCT PLANNING AND DEVELOPMENT **5**

Product Envisioning - Conceptualize Product -Product Roadmap -High-Level Planning. Initiation Architecture and Design - Testing Approach - Release Planning -Iterative Development -Design by Feature -Build by Feature -Certify by Feature - Continuous Build and Integration. Alpha Release/Product Qualification - Beta Release - Product Training Planning.

UNIT-III: PRODUCT SALES AND MARKETING **5**

Product Sales and Marketing Approach -Product Legal and Compliance Management -Product Market Rollout.

UNIT-IV: SERVICES AND SUPPORT and CASE STUDY **3**

Product Support -Product Governance -Monitoring and Control Through-Out Entire Product Lifecycle Core Concept - Examples - Types - Economics of Virtualizing - Use Cases - Key Technical Challenges.

Contact Periods:

Lecture: 15 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 15 Periods

REFERENCES:

1. Alyssa Dver Software Product Management: Managing Software Development from Idea to Product to Marketing to Sales (Execenablers) 1st Edition, Meghan Kiffer Publishers, 2003.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Recognize product planning and development.

CO2: Plan product sales and marketing.

CO3: Identify the product service and support.

19CSVAX09	IOT FOR TELECOMMUNICATION SYSTEMS	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To learn about IOT communication fundamentals.
- To design IOT system.
- To know about IOT system implementation and integration.

UNIT-I: WIRELESS AND IOT COMMUNICATION FUNDAMENTALS 4

End to End wireless Communications (Layers, Evolution,IP Based Networks) - Standard Forums (IETF, 3GPP), Roles of Forums, Examples - 2G and 3G Network Core, Call Flows, Architecture - 4G: Evolution From 3G, Current Status - Cellular IoT Standards: LTE-M, LTE-NB, EC-GPRS, and Clean Slate IOT

UNIT-II: IOT SYSTEM DESIGN 5

IOT Use Case: Representing Usecase, Design, Test Scenarios - Raspberry Pi Fundamentals - GUI Design for Device/Sensor Management and Analytics, GUI Testing,Automation - Communication Protocol Design (One or More of the Wireless Protocols): Callflows, Information Elements, Protocol Testing, Library Design for Encoding/Decoding - Database Design For Storing Sensor Information : SQL Vs. NOSQL, Graph Db,Correlation, Queries, Report.

UNIT-III: IOT SYSTEM IMPLEMENTATION 3

Sensor Programming (Based on Pi framework): Activating, Init, Extracting Data, Controlling - GUI Programming: Hands on With Stub Based Backend - Protocol Abstractions: Stub Based Programs On Protocol Testing (Client Server Based), With Opensource SW - Testing: Methods, Metrics, Integration Testing, Sub-System Testing

UNIT-IV: IOT SYSTEM INTEGRATION 3

Sending and Receiving Data from Sensors Over Wireless Protocols - Sensor Data Insertion into DB Using REST API - DB Integration With GUI (Query From GUI, Control From GUI) - Device Management and Analytics from GUI - End to End Integration.

Contact Periods:

Lecture: 15 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 15 Periods

REFERENCES:

1. StefaniaSesia, Matthew Baker, IssamToufik, LTE: The UMTS Long Term Evolution - From Theory to Practice , Wiley Publications, 2011.
2. ArshdeepBahga, Vijay Madisetti, Internet of Things - A Hands-on-Approach, VPT publishers, 2014.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Identify the IOT system components.

CO2: Design IOT System.

CO3: Implement and integrate IOT system.

19CSVAX10	SOCIAL AND PSYCHOLOGICALWELL BEING	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To learn about IOT social psychology, stress and life management.

UNIT I: DEFINING SOCIAL PSYCHOLOGY **3**

Defining social psychology and social influences on behavior. Analysis of Social and psychological problems and the solutions to address social problems.

UNIT II : STRESS AND COPING **4**

Nature and Concept of Stress – Sources of stress and how does stress cause illness – Chronic process and Acute process – Effect of stress on mental health – Concept of coping, Ways of coping and stress management

UNIT III: HUMAN STRENGTHS AND LIFE MANAGEMENT **5**

Classification of human strengths and virtues: Physical strengths and virtues - Mental strengths and virtues, Hope, Optimism – Gainful employment: Me/we balance – Resilience – Meditation and Self-introspection

UNIT IV: MODELS OF HEALTH AND ILLNESS **3**

Health and well-being - Introduction to Bio-medical model and its assumptions – Introduction to Bio-Psychosocial model and its assumptions – Advantages and disadvantages of Bio psychosocial model, Biomedical model v/s Bio-Psychosocial model – Concept of holistic health, its principles and importance.

CONTACT PERIODS:

Lecture: 15 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 15 Periods

REFERENCES:

1. Baron Frank W Schneider et all, Applied Social Psychology, II Ed., Sage Publications, 2012.
2. John T Cacioppo Laura & Freberg, Discovering Psychology the Science of Mind, Cengage Learning, 2013.
3. Frank W Schneider, Jamie & Gruman, Larry M Coutts, Applied Social Psychology, II Ed., Sage Publications.

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

CO1: Identify psychology components.

CO2: Know the effect pf stress and mental health.

CO3: Implement biomedical model to overcome mental illness.