

# **NANDHA ENGINEERING COLLEGE**

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE, New Delhi)  
Erode-638 052, Tamilnadu, India, Phone: 04294 – 225585



**Curriculum and Syllabi**

**for**

**B.E – Computer Science and Engineering [R15]  
(1st to 8th Semesters)**

(This Curriculum and Syllabi are applicable to Students admitted from the academic year [2015-2016] to [2016-2017])

**JUNE 2018**

**NANDHA ENGINEERING COLLEGE**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**PEOs OF B.E. COMPUTER SCIENCE AND ENGINEERING**

The following Programme Educational Objectives are designed for B.E. Computer Science and Engineering programme in Computer Science and Engineering based on the Department Vision & Mission to provide higher engineering education and motivate research in the field of Computer Engineering.

- PEO 1.** Graduates will be employed in IT industries to solve industrial technological issues.
- PEO 2.** Graduates will take up masters and pursue career paths in teaching and research.
- PEO 3.** Graduates will be an entrepreneur who develops, deploys and maintains Real-time software.
- PEO 4.** Graduates will continuously learn and adopt new technologies to solve communal issues.
- PEO 5.** Graduates will enhance leadership skills and contribute towards societal growth.

**PROGRAM OUTCOMES (POs) OF B.E. COMPUTER SCIENCE AND ENGINEERING**

On graduation from the Computer Science and Engineering programme, our students will have the ability to

1-12	GRADUATE ATTRIBUTES	PO No.	PROGRAMME OUTCOMES
1	Engineering Knowledge	PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem Analysis	PO2	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 and Development of Solutions	PO3	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	Investigation of Complex Problems	PO4	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	PO5	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	PO6	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	PO7	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	PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and Team Work.	PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	PO10	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	PO11	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	Lifelong Learning	PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **PROGRAM SPECIFIC OUTCOMES (PSOs):**

- PSO1.** Ability to understand the principles and working of hardware and software aspects in a computer system
- PSO2.** Ability to demonstrate knowledge in mathematical models, algorithms and software development methodologies
- PSO3.** Ability to develop practical competency in programming languages and open source platforms
- PSO4.** Ability to provide a foundation for higher studies, research and entrepreneurship

**NANDHA ENGINEERING COLLEGE (AUTONOMOUS), ERODE – 638 052**  
**REGULATIONS – 2015** **CHOICE BASED CREDIT SYSTEM**  
**B.E. COMPUTER SCIENCE AND ENGINEERING**

CURRICULAM:		I – VIII SEMESTERS	SYLLABI	I TO VI SEMESTERS				
SEMESTER: I								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	15EY101	Communicative English	HS	3	1	0	2	2
2.	15MY102	Linear Algebra, Analytical Geometry and Differential Calculus	BS	5	3	2	0	4
3.	15PY103	Engineering Physics	BS	3	3	0	0	3
4.	15CY101	Engineering Chemistry	BS	3	3	0	0	3
5.	15EC102	Digital Principles and System Design	ES	3	3	0	0	3
6.	15IT101	Computational Problem solving and C Programming	ES	3	3	0	0	3
PRACTICALS								
7.	15GY111	Physics and Chemistry Laboratory - I	BS	4	0	0	4	2
8.	15GY112	Soft Skills - I	EEC	2	0	0	2	1
9.	15EC111	Digital Laboratory	ES	2	0	0	2	1
10.	15IT111	Computer Programming Laboratory	ES	2	0	0	2	1
			TOTAL	30	16	2	12	23

<b>SEMESTER: II</b>								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	15EY201	Professional English	HS	3	1	0	2	2
2.	15MY202	Calculus and Laplace Transform	BS	5	3	2	0	4
3.	15PY202	Applied Physics	BS	3	3	0	0	3
4.	15CY201	Environmental Science & Engineering	HS	3	3	0	0	3
5.	15CS201	Advanced C & Data Structures	PC	3	3	0	0	3
6.	15MEC01	Engineering Graphics	ES	4	2	0	2	3
<b>PRACTICALS</b>								
7.	15GY211	Physics and Chemistry Laboratory - II	BS	4	0	0	4	2
8.	15GY212	Soft Skills – II	EEC	2	0	0	2	1
9.	15CS211	Advanced C & Data Structures Laboratory	PC	2	0	0	2	1
10.	15GYC11	Engineering Practices Laboratory	ES	4	0	0	4	2
<b>TOTAL</b>				<b>33</b>	<b>15</b>	<b>2</b>	<b>16</b>	<b>24</b>

SEMESTER: III								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	15MY302	Fourier Analysis, Integral Transform and Partial Differential Equations	BS	5	3	2	0	4
2.	15CS301	Operating Systems	PC	3	3	0	0	3
3.	15CS302	Object Oriented Paradigm and Programming	PC	3	3	0	0	3
4.	15CS303	Design and Analysis of Algorithms	PC	3	3	0	0	3
5.	15CS304	Microprocessor and Multicore Programming	ES	3	3	0	0	3
6.	15CS305	Computer Networks	PC	3	3	0	0	3
PRACTICALS								
7.	15CS311	Operating Systems Laboratory	PC	2	0	0	2	1
8.	15CS312	Object Oriented Programming Laboratory	PC	2	0	0	2	1
9.	15CS313	Computer Networks Laboratory	PC	4	0	0	4	2
10.	15GYC12	Soft Skills – Listening & Speaking	EEC	2	0	0	2	0
TOTAL				30	18	2	10	23

SEMESTER: IV								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	15MY404	Probability And Queuing Theory	BS	5	3	2	0	4
2.	15CS401	Database Systems	PC	3	3	0	0	3
3.	15CS402	Java Programming	PC	3	3	0	0	3
4.	15CS403	Computer Architecture and Organization	PC	3	3	0	0	3
5.	15CS404	Mobile Computing	PC	3	3	0	0	3
6.	15CS405	Software Engineering	PC	3	3	0	0	3
PRACTICALS								
7.	15CS411	Database Systems Laboratory	PC	4	0	0	4	2
8.	15CS412	Java Programming Laboratory	PC	2	0	0	2	1
9.	15CS413	Mobile Computing Laboratory	PC	4	0	0	4	2
10.	15GYC13	Soft Skills – Reading & Writing	EEC	2	0	0	2	0
TOTAL				32	18	2	12	24

SEMESTER: V								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	15MY501	Discrete Mathematics	BS	5	3	2	0	4
2.	15GEC02	Engineering Economics and Financial Accounting	HS	3	3	0	0	3
3.	15CS501	Web Technology	PC	5	3	0	2	4
4.	15CS502	Object Oriented Analysis and Design	PC	3	3	0	0	3
5.	15CS503	Graphics and Multimedia	PC	3	3	0	0	3
6.	E1	Elective (PE)	PE	3	3	0	0	3
PRACTICALS								
7.	15CS511	Case Tools Laboratory	PC	4	0	0	4	2
8.	15CS512	Graphics and Multimedia Laboratory	PC	4	0	0	4	2
9.	15GY511	Soft Skills Aptitude and Reasoning - I	EEC	2	0	0	2	0
TOTAL				30	18	2	12	24

SEMESTER:VI								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	15CS601	Security in Computing	PC	3	3	0	0	3
2.	15CS602	C# & .Net Framework	PC	5	3	0	2	4
3.	15CS603	Open Source Tools and Development	PC	3	3	0	0	3
4.	15CS604	Principles of Compiler Design	PC	3	3	0	0	3
5.	E2	Elective (PE)	PE	3	3	0	0	3
6.	E3	Elective (PE)	PE	3	3	0	0	3
PRACTICALS								
7.	15CS611	Open Source Laboratory	PC	4	0	0	4	2
8.	15GE611	Comprehension	PC	2	0	0	2	1
9.	15GY611	Soft Skills Aptitude and Reasoning - II	EEC	2	0	0	2	0
TOTAL				28	18	0	10	22

<b>SEMESTER: VII</b>								
<b>SL. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>CONTACT PERIODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>								
1.	15CS701	Principles of Cloud Computing	PC	3	3	0	0	3
2.	E4	Elective (PE)	PE	3	3	0	0	3
3.	E5	Elective (PE)	PE	3	3	0	0	3
4.	E6	Elective (PE/OE)	PE/OE	3	3	0	0	3
5.	E7	Elective (OE)	OE	3	3	0	0	3
<b>PRACTICALS</b>								
6.	15CS711	Security Laboratory	PC	4	0	0	4	2
7.	15GE711	Personality and Character Development	EEC	2	0	0	2	0
8.	15CS731	Project Work I	EEC	8	0	0	8	4
<b>TOTAL</b>				<b>29</b>	<b>15</b>	<b>0</b>	<b>14</b>	<b>21</b>

<b>SEMESTER: VIII</b>								
<b>SL. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>CONTACT PERIODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>								
1.	E8	Elective (PE/OE)	PE/OE	3	3	0	0	3
2.	E9	Elective (OE)	OE	3	3	0	0	3
<b>PRACTICALS</b>								
3.	15CS831	Project Work II	EEC	16	0	0	16	8
<b>TOTAL</b>				<b>22</b>	<b>6</b>	<b>0</b>	<b>16</b>	<b>14</b>

LIST OF PROFESSIONAL ELECTIVES (PE)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15CSX01	Data Science	PE	3	3	0	0	3
2.	15CSX02	Data Warehousing and Data Mining	PE	3	3	0	0	3
3.	15CSX03	Advanced Database Technologies	PE	3	3	0	0	3
4.	15CSX04	Data Analytics	PE	3	3	0	0	3
5.	15CSX05	High Performance Networks	PE	3	3	0	0	3
6.	15CSX06	TCP/IP Design and Implementation	PE	3	3	0	0	3
7.	15CSX07	Distributed Systems	PE	3	3	0	0	3
8.	15CSX08	Network Analysis and Management	PE	3	3	0	0	3
9.	15CSX09	Wireless Communication And Networks	PE	3	3	0	0	3
10.	15CSX10	Theory of Computation	PE	3	3	0	0	3
11.	15CSX11	Graph Theory	PE	3	3	0	0	3
12.	15CSX12	Information Retrieval Techniques	PE	3	3	0	0	3
13.	15CSX13	Mobile Application Development	PE	3	3	0	0	3
14.	15CSX14	Human Computer Interaction	PE	3	3	0	0	3
15.	15CSX15	Green Computing	PE	3	3	0	0	3
16.	15CSX16	Nano Computing	PE	3	3	0	0	3
17.	15CSX17	Knowledge Management	PE	3	3	0	0	3
18.	15CSX18	Embedded System	PE	3	3	0	0	3
19.	15CSX19	Image Processing Techniques	PE	3	3	0	0	3
20.	15CSX20	Artificial Intelligence	PE	3	3	0	0	3
21.	15ITC01	Internet of Things	PE	3	3	0	0	3
22.	15CSX22	Machine learning Techniques	PE	3	3	0	0	3
23.	15CSX23	Software Design And Architecture	PE	3	3	0	0	3
24.	15CSX24	Software Testing Methodologies	PE	3	3	0	0	3
25.	15CSX25	Software Agents	PE	3	3	0	0	3
26.	15CSX26	Software Quality Assurance	PE	3	3	0	0	3
27.	15CSX27	Software Engineering Project Management	PE	3	3	0	0	3
28.	15GEC01	Principles of Management	PE	3	3	0	0	3
29.	15GEC03	Professional Ethics and Human Values	PE	3	3	0	0	3
30.	15GEC04	Total Quality Management	PE	3	3	0	0	3

### LIST OF OPEN ELECTIVES (OE)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15CEZ01	Energy conservation in buildings	OE	3	3	0	0	3
2.	15CEZ02	Waste Management	OE	3	3	0	0	3
3.	15CEZ03	Air Pollution Management	OE	3	3	0	0	3
4.	15CEZ04	Building Services	OE	3	3	0	0	3
5.	15CSZ01	Software Engineering Methodologies	OE	3	3	0	0	3
6.	15CSZ02	Design Thinking	OE	3	3	0	0	3
7.	15CSZ03	Open Source Software	OE	3	3	0	0	3
8.	15CSZ04	Information Security	OE	3	3	0	0	3
9.	15ECZ01	Avionics	OE	3	3	0	0	3
10.	15ECZ02	Consumer Electronics	OE	3	3	0	0	3
11.	15ECZ03	Modern wireless communication system	OE	3	3	0	0	3
12.	15ECZ04	Electronic Testing	OE	3	3	0	0	3
13.	15EEZ01	Renewable Energy Technology	OE	3	3	0	0	3
14.	15EEZ02	Energy Conservation and Auditing	OE	3	3	0	0	3
15.	15EEZ03	Electrical Machines	OE	3	3	0	0	3
16.	15EEZ04	Wind and Solar Electrical Systems	OE	3	3	0	0	3
17.	15EIZ01	Autotronix	OE	3	3	0	0	3
18.	15EIZ02	Fiber Optic Sensors	OE	3	3	0	0	3
19.	15EIZ03	Industrial Automation	OE	3	3	0	0	3
20.	15EIZ04	Ultrasonic Instrumentation	OE	3	3	0	0	3
21.	15ITZ01	PC Hardware and Trouble Shooting	OE	3	3	0	0	3
22.	15ITZ02	Cyber Crime Investigations and Digital Forensics	OE	3	3	0	0	3
23.	15ITZ03	Developing Mobile Apps	OE	3	3	0	0	3
24.	15ITZ04	Software Project Management	OE	3	3	0	0	3
25.	15MEZ01	Six Sigma	OE	3	3	0	0	3
26.	15MEZ02	Project Management	OE	3	3	0	0	3
27.	15MEZ03	Electric Vehicle Technology	OE	3	3	0	0	3
28.	15MEZ04	Value Engineering	OE	3	3	0	0	3
29.	15MYZ01	Mathematical Structures	OE	3	3	0	0	3
30.	15MYZ02	Optimization Techniques	OE	3	3	0	0	3
31.	15MYZ03	Statics for Engineers	OE	3	3	0	0	3
32.	15MYZ04	Statistics for Engineers	OE	3	3	0	0	3
33.	15PYZ01	Nanomaterials	OE	3	3	0	0	3
34.	15PYZ02	Nuclear physics and reactors	OE	3	3	0	0	3
35.	15PYZ03	Space science and technology	OE	3	3	0	0	3

36.	15CZY01	Chemistry for engineers	OE	3	3	0	0	3
37.	15CZY02	Soil chemistry	OE	3	3	0	0	3
38.	15CZY03	Organic chemistry	OE	3	3	0	0	3

#### VALUE ADDED COURSES

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15GEY01	Communicative Hindi	OE	2	2	0	0	0
2.	15GEY02	Fundamentals of German	OE	2	2	0	0	0
3.	15GEY03	Basics of Japanese	OE	2	2	0	0	0

HUMANITIES AND SOCIAL SCIENCES (HS)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15EY101	Communicative English	HS	3	1	0	2	2
2.	15EY201	Professional English	HS	3	1	0	2	2
3.	15CY201	Environmental Science & Engineering	HS	3	3	0	0	3
4.	15GEC02	Engineering Economics and Financial Accounting	HS	3	3	0	0	3
BASIC SCIENCES (BS)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15MY102	Linear Algebra, Analytical Geometry and Differential Calculus	BS	5	3	2	0	4
2.	15PY103	Engineering Physics	BS	3	3	0	0	3
3.	15CY101	Engineering Chemistry	BS	3	3	0	0	3
4.	15GY111	Physics and Chemistry Laboratory -I	BS	4	0	0	4	2
5.	15MY202	Calculus and Laplace Transform	BS	5	3	2	0	4
6.	15PY202	Applied Physics	BS	3	3	0	0	3
7.	15GY211	Physics and Chemistry Laboratory -II	BS	4	0	0	4	2
8.	15MY302	Fourier Analysis, Integrated Transform and Partial Differential Equations	BS	5	3	2	0	4
9.	15MY404	Probability And Queuing Theory	BS	5	3	2	0	4
10.	15MY501	Discrete Mathematics	BS	5	3	2	0	4

ENGINEERING SCIENCES (ES)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15EC102	Digital Principles and System Design	ES	3	3	0	0	3
2.	15IT101	Computational Problem solving and C Programming	ES	3	3	0	0	3
3.	15EC111	Digital Laboratory	ES	2	0	0	2	1
4.	15IT111	Computer Programming Laboratory	ES	2	0	0	2	1
5.	15MEC01	Engineering Graphics	ES	4	2	0	2	3
6.	15GYC11	Engineering Practices Laboratory	ES	4	0	0	4	2
7.	15CS304	Microprocessor and Multicore Programming	ES	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15GY112	Soft Skills - I	EEC	2	0	0	2	1
2.	15GY212	Soft Skills – II	EEC	2	0	0	2	1
3.	15GYC12	Soft Skills – Listening & Speaking	EEC	2	0	0	2	0
4.	15GYC13	Soft Skills – Reading & Writing	EEC	2	0	0	2	0
5.	15GY512	Soft Skills Aptitude and Reasoning - I	EEC	2	0	0	2	0
6.	15GY612	Soft Skills Aptitude and Reasoning - II	EEC	2	0	0	2	0
7.	15GE711	Personality and Character Development	EEC	2	0	0	2	0
8.	15CS731	Project Work I	EEC	8	0	0	8	4
9.	15CS831	Project Work II	EEC	16	0	0	16	8

PROFESSIONAL CORE (PC)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15CS201	Advanced C & Data Structures	PC	3	3	0	0	3
2.	15CS211	Advanced C & Data Structures Laboratory	PC	2	0	0	2	1
3.	15CS301	Operating Systems	PC	3	3	0	0	3
4.	15CS302	Object Oriented Paradigm and Programming	PC	3	3	0	0	3
5.	15CS303	Design and Analysis of Algorithms	PC	3	3	0	0	3
6.	15CS305	Computer Networks	PC	3	3	0	0	3
7.	15CS311	Operating Systems Laboratory	PC	2	0	0	2	1
8.	15CS312	Object Oriented Programming Laboratory	PC	2	0	0	2	1
9.	15CS313	Computer Networks Laboratory	PC	4	0	0	4	2
10.	15CS401	Database Systems	PC	3	3	0	0	3
11.	15CS402	Java Programming	PC	3	3	0	0	3
12.	15CS403	Computer Architecture and Organization	PC	3	3	0	0	3
13.	15CS404	Mobile Computing	PC	3	3	0	0	3
14.	15CS405	Software Engineering	PC	3	3	0	0	3
15.	15CS411	Database Systems Laboratory	PC	4	0	0	4	2

16.	15CS412	Java Programming Laboratory	PC	2	0	0	2	1
17.	15CS413	Mobile Computing Laboratory	PC	4	0	0	4	2
18.	15CS501	Web Technology	PC	5	3	0	2	4
19.	15CS502	Object Oriented Analysis and Design	PC	3	3	0	0	3
20.	15CS503	Graphics and Multimedia	PC	3	3	0	0	3
21.	15CS511	Case Tools Laboratory	PC	4	0	0	4	2
22.	15CS512	Graphics and Multimedia Laboratory	PC	4	0	0	4	2
23.	15CS601	Security in Computing	PC	3	3	0	0	3
24.	15CS602	C# & .Net Framework	PC	5	3	0	2	4
25.	15CS603	Open Source Tools and Development	PC	3	3	0	0	3
26.	15CS604	Principles of Compiler Design	PC	3	3	0	0	3
27.	15CS611	Open Source Laboratory	PC	4	0	0	4	2
28.	15GE611	Comprehension	PC	2	0	0	2	1
29.	15CS701	Principles of Cloud Computing	PC	3	3	0	0	3
30.	15CS711	Security Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVE (PE)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15CSX01	Data Science	PE	3	3	0	0	3
2.	15CSX02	Data Warehousing and Data Mining	PE	3	3	0	0	3
3.	15CSX03	Advanced Database Technologies	PE	3	3	0	0	3
4.	15CSX04	Data Analytics	PE	3	3	0	0	3
5.	15CSX05	High Performance Networks	PE	3	3	0	0	3
6.	15CSX06	TCP/IP Design and Implementation	PE	3	3	0	0	3
7.	15CSX07	Distributed Systems	PE	3	3	0	0	3
8.	15CSX08	Network Analysis and Management	PE	3	3	0	0	3
9.	15CSX09	Wireless Communication And Networks	PE	3	3	0	0	3
10.	15CSX10	Theory of Computation	PE	3	3	0	0	3
11.	15CSX11	Graph Theory	PE	3	3	0	0	3
12.	15CSX12	Information Retrieval Techniques	PE	3	3	0	0	3
13.	15CSX13	Mobile Application Development	PE	3	3	0	0	3

14.	15CSX14	Human Computer Interaction	PE	3	3	0	0	3
15.	15CSX15	Green Computing	PE	3	3	0	0	3
16.	15CSX16	Nano Computing	PE	3	3	0	0	3
17.	15CSX17	Knowledge Management	PE	3	3	0	0	3
18.	15CSX18	Embedded System	PE	3	3	0	0	3
19.	15CSX19	Image Processing Techniques	PE	3	3	0	0	3
20.	15CSX20	Artificial Intelligence	PE	3	3	0	0	3
21.	15ITC01	Internet of Things	PE	3	3	0	0	3
22.	15CSX22	Machine learning Techniques	PE	3	3	0	0	3
23.	15CSX23	Software Design And Architecture	PE	3	3	0	0	3
24.	15CSX24	Software Testing Methodologies	PE	3	3	0	0	3
25.	15CSX25	Software Agents	PE	3	3	0	0	3
26.	15CSX26	Software Quality Assurance	PE	3	3	0	0	3
27.	15CSX27	Software Engineering Project Management	PE	3	3	0	0	3
28.	15GEC01	Principles of Management	PE	3	3	0	0	3
29.	15GEC03	Professional Ethics and Human Values	PE	3	3	0	0	3
30.	15GEC04	Total Quality Management	PE	3	3	0	0	3

OPEN ELECTIVES (OE)								
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	15CEZ01	Energy conservation in buildings	OE	3	3	0	0	3
2.	15CEZ02	Waste Management	OE	3	3	0	0	3
3.	15CEZ03	Air Pollution Management	OE	3	3	0	0	3
4.	15CEZ04	Building Services	OE	3	3	0	0	3
5.	15CSZ01	Software Engineering Methodologies	OE	3	3	0	0	3
6.	15CSZ02	Design Thinking	OE	3	3	0	0	3
7.	15CSZ03	Open Source Software	OE	3	3	0	0	3
8.	15CSZ04	Information Security	OE	3	3	0	0	3
9.	15ECZ01	Avionics	OE	3	3	0	0	3
10.	15ECZ02	Consumer Electronics	OE	3	3	0	0	3
11.	15ECZ03	Modern wireless communication system	OE	3	3	0	0	3

12.	15ECZ04	Electronic Testing	OE	3	3	0	0	3
13.	15EEZ01	Renewable Energy Technology	OE	3	3	0	0	3
14.	15EEZ02	Energy Conservation and Auditing	OE	3	3	0	0	3
15.	15EEZ03	Electrical Machines	OE	3	3	0	0	3
16.	15EEZ04	Wind and Solar Electrical Systems	OE	3	3	0	0	3
17.	15EIZ01	Autotronix	OE	3	3	0	0	3
18.	15EIZ02	Fiber Optic Sensors	OE	3	3	0	0	3
19.	15EIZ03	Industrial Automation	OE	3	3	0	0	3
20.	15EIZ04	Ultrasonic Instrumentation	OE	3	3	0	0	3
21.	15ITZ01	PC Hardware and Trouble Shooting	OE	3	3	0	0	3
22.	15ITZ02	Cyber Crime Investigations and Digital Forensics	OE	3	3	0	0	3
23.	15ITZ03	Developing Mobile Apps	OE	3	3	0	0	3
24.	15ITZ04	Software Project Management	OE	3	3	0	0	3
25.	15MEZ01	Six Sigma	OE	3	3	0	0	3
26.	15MEZ02	Project Management	OE	3	3	0	0	3
27.	15MEZ03	Electric Vehicle Technology	OE	3	3	0	0	3
28.	15MEZ04	Value Engineering	OE	3	3	0	0	3
29.	15MYZ01	Mathematical Structures	OE	3	3	0	0	3
30.	15MYZ02	Optimization Techniques	OE	3	3	0	0	3
31.	15MYZ03	Statics for Engineers	OE	3	3	0	0	3
32.	15MYZ04	Statistics for Engineers	OE	3	3	0	0	3
33.	15PYZ01	Nanomaterials	OE	3	3	0	0	3
34.	15PYZ02	Nuclear physics and reactors	OE	3	3	0	0	3
35.	15PYZ03	Space science and technology	OE	3	3	0	0	3
36.	15CYZ01	Chemistry for engineers	OE	3	3	0	0	3
37.	15CYZ02	Soil chemistry	OE	3	3	0	0	3
38.	15CYZ03	Organic chemistry	OE	3	3	0	0	3

### CREDIT DISTRIBUTION

SEM	HS	BS	PC	ES	EEC	PE	OE	TOTAL
I	2	12	-	8	1	-	-	23
II	5	9	4	5	1	-	-	24
III	-	4	16	3	0	-	-	23
IV	-	4	20	-	0	-	-	24
V	3	4	14	-	0	3	-	24
VI	-	-	16	-	0	6	-	22
VII	-	-	5	-	4	9	3	21
VIII	-	-	-	-	8	3	3	14
TOTAL	10	33	75	16	14	21	6	175

**TOTAL CREDITS (23+24+23+24+24+22+21+14) = 175 CREDITS**



**15EY101 COMMUNICATIVE ENGLISH**  
**(Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>

**OBJECTIVES:**

To enable students

- To improve their lexical, grammatical and communicative competence.
- To enhance their communicative skills in real life situations.
- To assist students understand the role of thinking in all forms of communication.
- To equip students with oral and appropriate written communication skills.
- To assist students with employability and job search skills.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Express their opinions clearly, speak convincingly, initiate a discussion, negotiate, and argue using appropriate communicative strategies.
- CO2 Explain effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- CO3 Relate different genres of texts infer implied meanings and critically analyze and evaluate them for ideas as well as for method of presentation.
- CO4 Infer unspoken and implied meanings and comprehend different spoken excerpts critically.
- CO5 Develop their professional communication skills.

**UNIT I: GRAMMAR**

(9)

Parts of Speech – Basic sentence structures- Types of sentences- Auxiliary verbs – Modal Auxiliaries- Articles - Prepositions –Tenses - Voices - Subject-Verb Agreement – Different Grammatical forms of the same word.

**UNIT II: VOCABULARY**

(9)

Synonyms – Antonyms – One Word Substitution – Words often Confused - Compound nouns- Countable and Uncountable Nouns–Spelling rules - Homophones and Homonyms.

**UNIT-III: CONVERSATIONAL SKILLS**

(9)

Strategies for Good Conversation – Improving fluency and Self Expression – Articulation – Voice quality – Role-play – One minute talk.

**UNIT IV: COMPREHENSIVE LISTENING AND READING**

(9)

Effective listening Strategies – Listening to Speeches and Lectures – Listening to Announcements – Listening and Gap Filling – Listening to Interviews – Reading Comprehension ( Extensive Reading).

**UNIT V: TECHNICAL WRITING**

(9)

Interpretation of Data – Highlighting problems & suggesting solution – Apology Letter – Inviting Dignitaries – Permission to undergo Industrial visit – Jumbled Sentences.

**TOTAL (L:45) =45 PERIODS**

**TEXT/ REFERENCES BOOKS**

1. Rizvi, Ashraf.M, "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.
2. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006
3. Hewings. M, "Advanced English Grammar", Cambridge University Press, Chennai, 2000.
4. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 2005.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1									x	x		x
2									x	x		x
3									x	x		
4									x	x		x
5									x	x		x

**15MY102 - LINEAR ALGEBRA, ANALYTICAL GEOMETRY & DIFFERENTIAL CALCULUS**  
( Common to CSE & IT Branches)

L	T	P	C
3	2	0	4

**OBJECTIVES:**

To enable students to

- Identify, formulate and solve Engineering problems.
- Use the techniques, Skills and Engineering tools necessary for engineering practice.
- Learn further topics of Mathematics in higher semesters in a graded manner.
- Appreciate the important role of Mathematical concepts in engineering applications.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Identify algebraic Eigen value problems from practical areas and obtain the Eigen solutions in certain cases and to have acquired the technique of diagonalizing a matrix which would render the Eigen solution procedure very simple.
- CO2 Have knowledge about the geometrical aspects of line, plane and sphere.
- CO3 Understand effectively the geometrical aspects of curvature, involutes and evolutes of plane curves, essential concepts for an engineer, as elegant applications of differential calculus.
- CO4 Understand and handle functions of more than one variable, from the points of view of their differentiation, expansions and extreme values, along with differentiation under integral sign which are encountered in engineering studies.
- CO5 Learn the method of solving differential equations of certain types, including systems of differential equations that they might encounter in their studies of other subjects in the same or higher semesters.

**UNIT I: LINEAR ALGEBRA**

(9)

Characteristic equation-Eigen values and Eigen vectors of a real matrix- Cayley Hamilton Theorem (Excluding proof) - Orthogonal transformation of a symmetric matrix to diagonal form - Quadratic form -Nature of Quadratic form.

**UNIT II: THREE DIMENSIONAL ANALYTICAL GEOMETRY**

(9)

Direction cosines and ratios- Angle between two lines – Equation of a plane –Angle between two planes- Equation of a straight line – Coplanar lines –skew lines – Equation of a sphere – Plane section of a sphere – Equation of a tangent plane – Orthogonal spheres.

**UNIT III: GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS**

(9)

Curvature – Curvature in Cartesian and polar co-ordinates-Centre and Radius of curvature-Circle of curvature-Evolutes and Involutives-Envelopes-Evolutes as envelope of normal's.(Simple and Standard Questions be asked).

**UNIT IV: FUNCTIONS OF SEVERAL VARIABLES**

(9)

Partial derivatives - Total differential-Differentiation of implicit functions-Taylor's expansion-Maxima and Minima-Constrained Maxima and Minima by Lagrange's multiplier method-Jacobians.

**UNIT V: ORDINARY DIFFERENTIAL EQUATIONS**

(9)

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Cauchy's and Legendre's equations.

**TOTAL(L:45+T:30)=75 PERIODS**

**TEXT BOOKS:**

1. Dr.B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna publications, 2012.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & sons, 2013.
3. Veerarajan.T, "Engineering Mathematics for first year", Third Edition, Tata McGraw Hill, 2011.

**REFERENCES:**

1. N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics: Sem-II", 5th Edition, Laxmi Publications. 2011.
2. P.Kandasamy, K.Thilagavathy, K.Gunavathy, "Engineering Mathematics for first Year", 9th Rv. Ed., S.Chand & Co Ltd, 2013.
3. Glyn James, "Advanced Engineering Mathematics", 7th Edition, Wiley India, (2007).
4. Dr. M.K.Venkataraman, "Engineering Mathematics", The National Publication co., Chennai, 2003.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x						x					
2	x	x	x				x				x	
3	x	x					x				x	
4	x	x	x				x		x		x	
5	x						x					

**15PY101 - ENGINEERING PHYSICS**  
( Common to All Branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To provide the basic ideas in large number of engineering subjects
- To develop the skills of the students in physics under various applications
- To provide the ideas of optics and laser technology
- To develop the ideas to design optical fiber sensors
- To Provide knowledge in wave and particle physics

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Acquire knowledge regarding Acoustics and ultrasonic
- CO2 Applying knowledge in the fields of optics & laser technology
- CO3 Design the sensors using the knowledge of fiber optics
- CO4 Understand the knowledge of wave, particle nature and matter waves
- CO5 Analyze the different kind of crystal structures and gain knowledge about crystal growth.

**UNIT I - ACOUSTICS & ULTRASONICS**

**(9)**

Classification of sound – characteristics of musical sound – loudness – Weber – Fechner law – absorption coefficient – reverberation – reverberation time – Sabine's formula (growth & decay). Factors affecting acoustics of buildings and their remedies. Ultrasonic: Introduction - properties of ultrasonics - magnetostriction - piezo electric methods. Medical application: Sonogram - Engineering Application: Ultrasonic A B C scan methods

**UNIT II - OPTICS & LASER TECHNOLOGY**

**(9)**

Interference: Air wedge – theory – uses – testing of flat surfaces – determination of thickness of a thin wire. Types of lasers – Nd – YAG laser – CO<sub>2</sub> laser – semiconductor laser (homo-junction & hetero-junction). Applications: Determination of particle size using laser - Holography – construction – reconstruction – Lasers in industry (Material Processing) and Medical field (Surgery)

**UNIT III - FIBER OPTICS AND SENSORS**

**(9)**

Principle of light transmission through fiber - expression for acceptance angle and numerical aperture – Fabrication of optical fibers- Double crucible method - types of optical fibers (material, refractive Index profile and mode) fiber optic communication system. Splicing – Applications of optical fiber - Sensors- temperature- pressure sensor and displacement sensor Medical Endoscope.

**UNIT IV - WAVE AND PARTICLE PHYSICS**

**(9)**

Development of quantum theory – de Broglie wavelength – properties of matter waves - G.P Thomson experiment - Schrödinger's wave equation – time dependent – time independent wave equations – physical significance – applications – particle in a one dimensional potential box - Compton Effect – theory and experimental verification.

**UNIT V - CRYSTALLOGRAPHY**

**(9)**

Lattice – unit cell – Bravais lattices – lattice planes – Miller indices – 'd' spacing in cubic lattice – calculation of number of atoms per unit cell – atomic radius – coordination number – packing factor for SC, BCC, FCC and HCP structures – Crystal growth techniques- solution, melt (Czochralski) and vapour growth techniques(qualitative)

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. V. Rajendran, Engineering Physics, Tata McGraw-Hill, New Delhi, 2011.
2. K. Tamilarasan, K. Prabu, Engineering Physics I, Second Edition, Tata McGraw-Hill. New Delhi. 2011.
3. Senthilkumar. G Engineering Physics I VRB Publishers, 2011.

**REFERENCES:**

1. P. K. Palanisami, Physics for Engineers, Vol. 1, Scitech Pub. (India) Pvt. Ltd., Chennai, 2002.
2. M. N. Avadhanulu and P. G. Kshirsagar, A Textbook of Engineering Physics, S. Chand & Company Ltd., New Delhi, 2005.
3. V. Rajendran and A. Marikani, Physics I, TMH, New Delhi, 2004.
4. R. K. Gaur and S. L. Gupta, Engineering Physics, Dhanpat Rai Publishers, New Delhi, 2006.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x			x			x	x	x
2	x	x	x	x		x	x			x	x	x
3	x			x	x		x	x		x	x	x
4	x	x										
5	x	x								x		

**15CY101 - ENGINEERING CHEMISTRY**  
**(Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- Become conversant with the principles of water characterization and treatment of potable and industrial purposes.
- Study about the principles of electrochemistry, energy storage devices, principles of corrosion control and chemical kinetics.
- Principles of polymer chemistry and Engineering applications of polymers and adsorption.
- Study about the surface chemistry.
- Gain well founded knowledge of chemistry of fuels and lubricants.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Apply knowledge of fundamental principles of chemistry.
- CO2 Define and solve engineering problems, including the utilization of creative and innovative skills.
- CO3 Gain practical experience with chemical process equipment as well as to analyze and interpret data.
- CO4 Understand the impact of engineering solutions in a global, economic, environmental and societal content.
- CO5 Gain the knowledge about fuels and lubricants.

**UNIT-I WATER TECHNOLOGY**

**(9)**

Hardness-types,- estimation by EDTA method - domestic water treatment - disinfection methods (chlorination, ozonation and UV treatment) - boiler troubles (scale, sludge, priming, foaming and caustic embrittlement) - external conditioning - demineralization process - desalination - reverse osmosis method. Determination of Fe in water by colorimetry - determination of sodium in water by flame photometry.

**UNIT-II ELECTROCHEMISTRY AND CORROSION**

**(9)**

Electrochemistry - electrode potential - reference electrode - standard hydrogen electrode (SHE) and calomel electrode - Nernst equation and problems, potentiometric titration (redox). Conductance measurements - conductometric titration (acid-base). Batteries - types,- lead acid battery. Corrosion - Chemical corrosion - electrochemical corrosion - corrosion control - sacrificial anode method.

**UNIT-III POLYMERS AND NANOMATERIALS**

**(9)**

Polymers – classification, addition, condensation and co polymerization - plastics - thermoplastics and thermosetting plastics - preparation, properties and uses of PVC, PET, Teflon and nylon. Polymer processing – compression and injection moulding techniques. Nano-materials - Carbon nanotubes - synthesis and their applications.

**UNIT-IV CHEMICAL KINETICS AND SURFACE CHEMISTRY**

**(9)**

Order of a reaction (definition) - kinetics of first order reaction – acid catalysed hydrolysis of ester, - kinetics of second order reaction – base catalysed hydrolysis of ester - Arrhenius equation - effect of temperature on reaction rate - Surface chemistry: Adsorption - types of adsorption - Langmuir adsorption isotherm – role of adsorption in catalytic reactions.

**UNIT-V FUELS AND LUBRICANTS**

**(9)**

Fuels: Coal - proximate analysis - metallurgical coke - manufacture by Otto-Hoffmann method. Liquid fuels - knocking - octane number and cetane number - synthetic petrol - Fischer Tropsch and Bergius processes. Lubricants - properties– viscosity index, flash and fire points, cloud and pour points and oiliness – Flue gas analysis – Orsat apparatus.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. C.Jain and Monica Jain, Engineering Chemistry vol I & II, Dhanpat Rai Pub.Co., New Delhi, 15<sup>th</sup> Edition (2013).
2. S.S.Dara, A Text book of Engineering Chemistry, S.Chand & Co.Ltd., New Delhi (2014).
3. Dr.A.Ravikrishnan, Engineering chemistry I & Engineering chemistry II., Sri Krishna Hitech Publishing co. Pvt .Ltd., Chennai, 13<sup>th</sup> Edition (2012).

**REFERENCES:**

1. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, PHI learning private Ltd, New Delhi (2009).
2. B. Sivashankar, Engineering Chemistry, Tata McGraw-Hill Pub. Co. Ltd. New Delhi (2008).
3. R. Sivakumar and N. Sivakumar, Engineering Chemistry, Tata McGraw-Hill publishing company limited, New Delhi (2009).

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x											
2	x	x	x	x					x	x		x
3			x	x	x				x		x	x
4	x	x	x								x	x
5												

**15EC102 - DIGITAL PRINCIPLES AND SYSTEM DESIGN**  
( Common to CSE & IT Branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- Learn how to design digital circuits, by simplifying the Boolean functions.
- Give an idea about Combinational Circuit and HDL basics
- Design the Synchronous Sequential Circuits
- Design the Asynchronous Sequential Circuits
- Give an idea about designs using PLDs, and write codes for designing larger digital systems.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Design digital circuits, by simplifying the Boolean functions.
- CO2 Give an idea about Combinational Circuit and HDL basics
- CO3 Design the Synchronous Sequential Circuits
- CO4 Design the Asynchronous Sequential Circuits
- CO5 Design using PLDs, and write codes for designing larger digital systems

**UNIT I - BOOLEAN ALGEBRA AND LOGIC GATES**

(9)

Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean Algebra Theorems – Boolean Functions – Simplification of Boolean Functions using Karnaugh Map Method – Logic Gates – NAND and NOR Implementations.

**UNIT II - COMBINATIONAL LOGIC**

(9)

Combinational Circuits – Circuits for Arithmetic Operations – Application circuits for Multiplexer, De-multiplexer, Decoder and Encoder – Introduction to HDL – HDL Models of Combinational circuits (simple examples).

**UNIT III - SYNCHRONOUS SEQUENTIAL LOGIC**

(9)

Sequential Circuits – Flip Flops – Design examples – State Reduction and State Assignment – Shift Registers – Counters – HDL for Sequential Logic Circuits (simple examples).

**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 - PROGRAMMABLE LOGIC DEVICES**

(9)

Error Detection and Correction Circuits – Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices – Application Specific Integrated Circuits

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. Morris Mano M. and Michael D. Ciletti, "Digital Design", IV Edition, Pearson Education, 2008.

**REFERENCES:**

1. John F. Wakerly, "Digital Design Principles and Practices", Fourth Edition, Pearson Education, 2007.
2. Charles H. Roth Jr, "Fundamentals of Logic Design", Fifth Edition – Jaico Publishing House, Mumbai, 2003.
3. Donald D. Givone, "Digital Principles and Design", Tata Mcgraw Hill, 2003.
4. D. P. Leach, A. P. Malvino, "Digital Principles and Applications", TMH, 2010.

*Approved by third Academic council*

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x				x	x	x	x	x
2	x	x	x	x	x			x	x	x	x	x
3	x	x	x	x	x			x	x	x	x	x
4	x	x	x	x	x			x	x	x	x	x
5	x	x	x	x					x		x	x

**15IT101- COMPUTATIONAL PROBLEM SOLVING AND C PROGRAMMING**  
(Common to CSE & IT Branches)

L	T	P	C
3	0	0	3

**OBJECTIVES :**

- To know the correct and efficient ways of solving problems.
- To learn the basics of C declarations, operators and expressions.
- To work on all the elementary statements (Loop, Branch).
- To learn the manipulation of arrays and strings
- Learn on the manipulation of functions

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Understand the basic terminology used in computer programming.
- CO2 Use different data types and operators in a computer program.
- CO3 Design programs involving decision structures and loops.
- CO4 Write programs using arrays.
- CO5 Develop programs using functions by different parameter passing techniques.

**UNIT-1 BASICS OF COMPUTERS & PROBLEM SOLVING (9)**

Computer Basics - Applications and characteristics of Computer - Computer organization - Computer Software- Types of software - Software Development steps - Algorithms - Flowchart - Pseudo code

**UNIT-2 INTRODUCTION TO C (9)**

Introduction to C– Assembler, compiler and interpreter - Structure of C program – Programming Rules – Executing C program - C Declarations: Tokens – keywords – identifiers – constants - data types – variable declaration and initialization – type conversion – constant and volatile variables – operators and expressions

**UNIT-3 CONTROL STRUCTURES (9)**

Managing Input and Output operations - Decision Statements: if Statements – if-else Statement – Nested if-else – if-else-if ladder– goto statement – switch statement – nested switch case – Loop Control: for loop –while loop – do while loop – Nested Loop Statements – break and continue statement

**UNIT-4 ARRAYS AND STRINGS (9)**

Introduction to Array – Definition - Array initialization - Characteristics – One Dimensional Array – Array operations - Two dimensional arrays – Multi dimensional array – Strings and String handling functions.

**UNIT-5 FUNCTIONS (9)**

Functions: Basics - definition – Elements of User defined Functions - return statement, Function types, Parameter Passing Techniques, Function returning more values - Passing Array to Functions, Function as arguments – functions with decision and loop statements – recursion – Storage class

**TOTAL (L:45) : 45 HOURS**

**TEXT BOOK:**

1. Ashok N. Kamthane, "Programming in C", Second Edition, Pearson Education, 2013.

**REFERENCES:**

1. Yashavant Kanetkar, "Let us C", BPB publications, New Delhi, 3<sup>rd</sup> Ed., 2011.
2. Pradip Dey, Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.
3. Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
4. R.G. Dromey, "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x							x		
2	x	x										x
3	x	x	x						x			x
4	x	x	x						x			x
5	x	x	x		x				x			x

**15GY111 - PHYSICS AND CHEMISTRY LABORATORY- I**  
**(Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**OBJECTIVES:**

- To provide the basic practical exposure to all the engineering and technological streams in the field of physics.
- To provide the basic practical exposure to all the engineering and technological streams in the field of chemistry.
- The students are able to know about the water containing impurities and some physical parameters.
- To gain the knowledge about light, sound, laser, fiber optics and magnetism.
- To develop the knowledge of conductometric titration and viscometry.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Acquire the fundamental knowledge in optics such as interference, Diffraction and Understand about the spectral instruments etc.
- CO2 Gain the basic knowledge about handling the laser light and identify the basic parameters of an optical fiber.
- CO3 Analyze the properties of matter with sound waves.
- CO4 Apply knowledge of measurement of hardness producing ions, chloride, alkalinity, DO, conductance, EMF and pH.
- CO5 Understand the impact of water quality and solve engineering problems.

**LIST OF EXPERIMENTS:**

**PHYSICS LABORATORY-I**

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of laser parameters - wavelength, particle size and angle of Divergence of a Laser.
4. Determination of acceptance angle and numerical aperture of an optical fiber.
5. Determination of wavelength of mercury spectrum – spectrometer grating.
6. Determination of Hysteresis loss in a ferromagnetic material.

**CHEMISTRY LABORATORY- I**

1. Estimation of hardness of Water by EDTA
2. Conductometric titration of strong acid Vs strong base
3. Determination of DO in water (Winkler's method)
4. Estimation of Chloride in a Water sample (Argentometric)
5. Conductometric precipitation titration using barium chloride and sodium sulphate
6. Determination of molecular weight and degree of polymerization using viscometry.

**TOTAL (P:60) = 60 PERIODS**

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x		x	x			x	x	
2	x	x		x			x					
3	x	x		x								
4	x	x		x		x	x					
5	x	x		x		x	x					

*Approved by third Academic council*

**15GY112- SOFT SKILLS – I**  
**(Common to All Branches)**

L	T	P	C
0	0	2	1

**OBJECTIVES:**

- To develop inter personal skills and be an affective goal oriented team player.
- To develop professionals with idealistic, practical and moral values.
- To develop communication in writing techniques.
- To re-engineer attitude and understand its influence on behaviour.
- To become self- confident individuals by mastering inter-personal skills, team management skills and leadership skills.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Analyze their strength and weakness.
- CO2 Understand the importance of non-verbal communication.
- CO3 Get exposure about the fundamentals of GDs and Interviews.
- CO4 Communicate and present their ideas.
- CO5 Know how to prepare Resume and write Report efficiently.

**UNIT I**

**(6)**

Self-Analysis – Self Introduction – Ice breaking - Identify strength and weakness – Self- esteem and Confidence.

**UNIT II**

**(6)**

Non-Verbal – Body Language of self and others presentation skills – Stages involved in an effective presentation – Selection of topic, content, aids – Engaging the audience - Time management.

**UNIT III**

**(6)**

Group Discussion – Understanding the objective and skills tested in GD – Types of GD – Roles in a GD – Do's & Don'ts – Video Modules, fundamentals of placement techniques. Interview Skills – Self preparation checklist – Grooming tips (Do's& Don'ts) – Video Modules.

**UNIT IV**

**(6)**

Out of box thinking and General behaviours.

**UNIT V**

**(6)**

Preparing Resume and Report.

**TOTAL (P:30) = 30 PERIODS**

**REFERENCE:**

1. Andrews, Sudhir. 1988. *How to Succeed at Interviews*. 21<sup>st</sup> Reprint. Tata McGraw-Hill. New Delhi.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1									x	x		x
2									x	x		x
3									x	x		x
4									x	x		x
5									x	x		x

**15EC111 - DIGITAL LABORATORY**  
**(Common to CSE & IT Branches)**

L	T	P	C
0	0	2	1

**OBJECTIVES:**

- To impart the concepts of digital electronics practically and train students with all the equipments which will help in improving the basic knowledge

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Know the different Logic gates used in Digital system and NAND/NOR implementation.
- CO2 Simplify the Boolean equations by K-Map method.
- CO3 Design/ test a Combinational logic system using gates
- CO4 Design/ test a Sequential logic system using gates
- CO5 Write HDL program for Digital Logic System design.

**LIST OF EXPERIMENTS:**

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for simple arbitrary functions.
3. Design and implementation of combinational circuits.
  - binary adder / subtractor
  - Parity generator / checker
  - Magnitude Comparator
  - Multiplexers/De-multiplexer
4. Design and implementation of sequential circuits:
  - Shift –registers
  - Synchronous and asynchronous counters
5. Coding combinational / sequential circuits using HDL.
6. Design and implementation of a simple digital system (Mini Project).

**TOTAL (P:30) = 30 PERIODS**

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x						x
2	x	x	x	x		x						
3	x	x	x	x		x						
4	x	x	x	x		x						
5	x	x	x	x		x						

*Approved by third Academic council*

**15IT111 - C PROGRAMMING LABORATORY**  
**(Common to CSE & IT Branches)**

L	T	P	C
0	0	2	1

**OBJECTIVES:**

- Identify and understand the representation of numbers, alphabets and other characters in computer system.
- Identify and understand word document, table and letter preparation.
- Identify and understand the charts, formula editor and flowchart symbols.
- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language.
- Study, analyze and understand concepts of arrays and functions in 'C'.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

Acquire the basic knowledge of computer hardware and software.

- C01 Acquire the basic knowledge of computer hardware and software.
- C02 Implement software development tools like flowcharts, etc.
- C03 Design programs involving decision structures, loops.
- C04 Write simple programs on arrays of different dimensions.
- C05 Develop programs using functions and recursions.

**Word Processing**

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation

**Spread Sheet**

4. Chart - Line, XY, Bar and Pie.
5. Formula - formula editor

**RAPTOR –Tool**

6. Drawing - flow Chart

**C-Programming**

7. Program Using Operators, Expressions and IO formatting
8. Program Using Decision Making
9. Program Using Looping
10. Program Using Arrays
11. Program Using Strings
12. Program Using Functions
13. Program Using Recursion

**HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS**

**Hardware**

- LAN System with 33 nodes (OR) Standalone PCs – 33 Nos.
- Printers – 3 Nos.

**Software**

- OS – Windows / UNIX Clone
- Application Package – Office suite
- RAPTOR –Tool
- Compiler – C

**TOTAL (P:30) = 30 PERIODS**

*Approved by third Academic council*

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and Pos												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x		x	x		x	x	x
2	x	x	x	x	x				x	x		x
3	x	x	x	x	x		x				x	x
4	x	x	x	x	x		x		x	x	x	x
5	x	x	x	x	x		x				x	x

**15EY201 - PROFESSIONAL ENGLISH**  
**(Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>

**OBJECTIVES:**

To enable students

- To convert the conceptual understanding of communication into everyday practice.
- To sensitize students to the nuance of the basic listening skills and to explain effectively for active reading.
- To train students to summon words, phrases relevant to the immediate communication tasks.
- To prepare students acquire the ability to write effectively in English in real life situations and work related situations.
- To make students reflect and improve their use of body language – posture, gesture, facial expression, tone.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Develop communicative proficiency by articulating words and sentences undoubtedly.
- CO2 Interpret different accents and modulations through active listening and effective reading.
- CO3 Prepare, organize, and deliver an engaging oral presentation and articulate their own ideas in relation to other voices and ideas.
- CO4 Write effectively for a variety of professional and social settings.
- CO5 Understood the significance of soft skills in the working environment.

**UNIT I: GRAMMAR**

**(9)**

Degrees of Comparison - Transformation of Sentences – Correction of errors – Reported Speech – Word Formation – Proximity of Concord - Connectives - Phrasal Verbs.

**UNIT II: VOCABULARY**

**(9)**

Building Vocabulary using Thesaurus – Cloze Test –Idioms and Phrases - Analogy- Collocation – Modifiers - Redundancy.

**UNIT-III: LISTENING AND SPEAKING**

**(9)**

Introduction to articulation skills (Speech Pattern) - Activity based Listening and Speaking Practice (Listening to News, practicing Short Speeches and Debate).

**UNIT IV: READING**

**(9)**

Reading Practice using General and Technical Articles from Newspapers and Science magazines – Reading short notices, Advertisements and passages –Levels of Reading Comprehension.

**UNIT V: WRITING**

**(9)**

Interpretation of pictures and cartoons – Slogan writing – Dialogue writing – Theme building exercises – Paragraph Completion – Instructions –Exercise on accuracy, brevity and correctness.

**TOTAL (L:15+P:30) =45 PERIODS**

**TEXT/ REFERENCES BOOKS:**

1. Rizvi, Ashraf M, "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.
2. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
3. Hewings. M, "Advanced English Grammar", Cambridge University Press, Chennai, 2000.
4. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 2005.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1									x	x		x
2									x	x	x	x
3									x	x		x
4									x	x		x
5									x	x	x	x

**15MY202 -CALCULUS & LAPLACE TRANSFORM**  
(Common to CSE & IT Branches)

L	T	P	C
3	2	0	4

**OBJECTIVES:**

To enable students

- Apply knowledge of Mathematics in Engineering.
- Communicate problem solutions using correct Mathematical terminology.
- Apply rigorous and analytic approach to analyse and solve differential equations.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Have learnt the methods of double and triple integration, which are needed in their studies in other areas and gained confidence to handle integrals of higher orders.
- CO2 Have studied the basics of vector calculus comprising of gradient, divergence and curl and line, surface and volume integrals and the classical theorems involving them, which would be encountered by them in their engineering subjects in the same or higher semesters.
- CO3 Have a good grasp of analytic functions and their interesting properties which could be exploited in a few engineering areas and be introduced to the host of conformal mappings with a few standard examples that have direct application.
- CO4 Have grasped the basis of complex integration and the concept of contour integration which is an important tool for evaluation of certain integrals encountered in practice.
- CO5 Have a sound knowledge of Laplace transform and its properties and sufficient exposure to solution of certain linear differential equations using the Laplace transform techniques which have applications in other subjects of the current and higher semesters.

**UNIT I: MULTIPLE INTEGRALS**

(9)

Double integration in Cartesian Co-ordinates-Change of order of integration-Area as double integral- Triple integration in Cartesian Co-ordinates-Volume as triple integrals.

**UNIT II: VECTOR CALCULUS**

(9)

Gradient and Directional derivative -Divergence and Curl – Irrotational and solenoidal vector fields – Line integral over a plane curve – Surface integral and volume integral – Green's, Gauss divergence, Stokes Theorem (Statement only)-Verification and Evaluation.

**UNIT III: ANALYTIC FUNCTIONS**

(9)

Functions of a complex variable - Analytic functions – Necessary and sufficient conditions for analyticity (Statement only) – Properties – Harmonic conjugate – Construction of analytic function – Conformal mapping – Mapping by functions:  $w = z + c$ ,  $cz$ ,  $1/z$ , and Bilinear transformation.

**UNIT IV: COMPLEX INTEGRATION**

(9)

Cauchy's integral theorem and integral formula – Taylor's and Laurent's series - Singularities - Residues – Residue theorem (Statement only) - Application of Residue theorem to evaluate real integrals – Evaluation of contour integrals of the type (i) Around unit circle  $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$  (ii)  $\int_{-\infty}^{\infty} \frac{P(x)}{Q(x)} dx$  with no pole on real axis.

**UNIT V: LAPLACE TRANSFORM**

(9)

Definition-To discuss about the Laplace Transform of Standard functions:  $e^{at}$ ,  $\sin at$ ,  $\sinh at$ ,  $t^n$ ,  $f'(t)$ ,  $f''(t)$  -First Shifting Theorem (Statement only) - Initial and Final value Theorems. Inverse Laplace transforms - Convolution theorem (Statement only) – Applications of Laplace transform for differential equations of 2<sup>nd</sup> order with constant co-efficients.

**TOTAL (L:45+T:30=75) PERIODS**

*Approved by third Academic council*

**TEXT BOOKS:**

1. Dr.B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna publications, 2012.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & sons, 2013.
3. Veerarajan.T, "Engineering Mathematics for first year", Third Edition, Tata McGraw Hill, 2011.

**REFERENCES:**

1. N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics: Sem-II", 5th Edition, Laxmi Publications. 2011.
2. P.Kandasamy, K.Thilagavathy, K.Gunavathy, "Engineering Mathematics for first Year", 9th Rv. Ed., S.Chand & Co Ltd, 2013.
3. Glyn James, "Advanced Engineering Mathematics", 7th Edition, Wiley India, (2007).

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x								x			
2	x								x			
3	x	x	x							x	x	
4	x								x			
5	x											

**15PY202 - APPLIED PHYSICS**  
**(Common to CSE & IT Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To provide the basic ideas in electrical conduction, conductors, semiconductors and nano technology.
- To understand the fundamental concepts on solid state physics.
- To provide the basic knowledge in luminescence and optoelectronic devices.
- To understand the basic knowledge in magnetism and data storage devices.
- To update the recent development about modern engineering materials.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- C01 Acquire knowledge about conductors, semiconductors and superconductors.
- C02 Distinguish between conductors, semiconductors and super conductors.
- C03 Understand the magnetism and its applications.
- C04 Design various optoelectronic devices
- C05 Aware of recent trends in nanotechnology

**UNIT I - CONDUCTING MATERIALS**

**(9)**

Electron theories of conductivity - postulates of classical free electron theory- derivation of electrical conductivity of metals (Drude- Lorentz theory) - merits and demerits. Derivation of thermal conductivity – Wiedeman-Franz law-verification. Fermi energy - Importance of fermi energy - Fermi-Dirac distribution function and its variation with temperature - density of energy states- calculation of density of electrons.

**UNIT II - SEMICONDUCTING MATERIALS & SUPERCONDUCTING MATERIALS**

**(9)**

**SEMICONDUCTORS:** Elemental and compound semiconductors - Intrinsic semiconductor – carrier concentration derivation – Variation of Fermi level with temperature – electrical conductivity – band gap determination – Extrinsic semiconductors (qualitative) – variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – Applications.

**SUPERCONDUCTIVITY:** Properties - Types of superconductors – BCS theory of superconductivity – Applications of superconductors – SQUID, cryotron, magnetic levitation.

**UNIT III - MAGNETIC MATERIALS**

**(9)**

Origin of magnetic moment – Bohr magneton – Types of magnetic materials – Domain theory – Hysteresis – soft and hard magnetic materials. Ferrites – applications – magnetic recording and readout – tapes, floppy and magnetic disc drives.

**UNIT IV - OPTICAL DEVICES**

**(9)**

Optical properties of semiconductor- Excitons-traps-colour centre- Types of colour centres- luminescence-fluorescence and phosphorescence-liquid crystal displays-dynamic scattering display-twisted nematic crystal display - Light emitting diodes- solar cell.

**UNIT V - MODERN ENGINEERING MATERIALS & NANOTECHNOLOGY**

**(9)**

Metallic glasses: preparation, properties and applications. Shape Memory Alloys (SMA): Characteristics, properties of NiTi alloy, applications, advantages and disadvantages of SMA. Nanomaterials: synthesis –plasma arcing – chemical vapour deposition – sol-gel – electro deposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: fabrication – arc method – pulsed laser deposition –structure – properties and applications.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. V.Rajendran, "Engineering Physics", Tata McGraw-Hill. New Delhi.2011.
2. P.K.Palanisami, "Physics for Engineers-Volume I", Scitech publications (India) Pvt.Ltd, Chennai, 2002.
3. M.N.Avadhanulu, P.G.Kshirsagar "A Text book of Engineering Physics", S.Chand, 2011.

**REFERENCES:**

1. Jacob Millman, Charistos C Halkilas, Satyabrata Jit "Electronic Devices & Circuits", Tata McGraw Hill Education Private Limited, 2010, Third Edition.
2. Ben G.Streetman, Sanjay Banerjee, "Solid State Electronic Devices", Pearson Education, 2006, Fifth Edition.
3. G.Senthil Kumar, N.Iyandurai, "Physics-II", VRB Publishers, 2005-2006, Revised Edition.
4. S.O. Pillai, "Solid State Physics", New Age International Publications, New Delhi, 2010.

**Mapping of Course Outcome and Programme Outcome**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x	x						x
2	x	x		x			x					x
3	x	-	x				x	x				x
4	x	x	x	x	x		x	x				x
5	x	x	x	x			x					x

## 15CY201 - ENVIRONMENTAL SCIENCE AND ENGINEERING

( Common for All Branches)

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To understand the constitutes of the environment.
- The students should be conversant with valuable resources
- To know about the role of a human being in maintaining a clean environment.
- To maintain ecological balance and preserve bio-diversity.
- To get knowledge about the conservation of environment for the future generation.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Design a system, component, or process to meet desired needs
- CO2 Identify, formulate, and solve environmental engineering problems
- CO3 Understand the professional and ethical responsibility as related to the practice of environmental engineering and the impact of engineering solutions in a global context
- CO4 Use the techniques, skills, and modern engineering tools necessary for environmental engineering practice.
- CO5 Acquire the knowledge of information technology in environmental science.

### UNIT- I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES (9)

Environment: Scope – importance - need for public awareness. Forest resources: Use-over exploitation-deforestation. Water resources: Use-over utilization of surface and ground water - conflicts over water. Mineral resources: Use-exploitation-environmental effects of extracting and using mineral resources. Food resources: World food problems changes caused by agriculture. Effects of modern agriculture - fertilizer- pesticide problems. Energy resources: Renewable energy sources - solar energy - wind energy. Land resources: land degradation - soil erosion. Role of an individual in conservation of natural resources.

### UNIT- II ECOSYSTEMS AND BIODIVERSITY (9)

Concepts of an ecosystem: Structure and function of an ecosystem - Producers, consumers and decomposers. Food chains- food webs. Types of ecosystem: Structure and functions of forest ecosystem and river ecosystem. Biodiversity: Value of biodiversity: consumptive use-productive use - social values - ethical values - aesthetic values. Hotspots of biodiversity -Threats to biodiversity: Habitat loss - poaching of wildlife and man wildlife conflicts- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

### UNIT - III ENVIRONMENTAL POLLUTION (9)

Pollution: Causes, effects and control measures of Air pollution, Water pollution, Soil pollution and Noise pollution. Solid waste management: Causes - effects -control measures of urban and industrial wastes. Role of an individual in prevention of pollution - Disaster managements: Floods - cyclone- landslides.

### UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT (9)

Water conservation - rain water harvesting. Climate change - global warming - acid rain - ozone layer depletion. Environment protection act: Air (Prevention and control of pollution) Act - Water (prevention and control of pollution) Act - Wildlife protection Act - Forest conservation Act.

### UNIT V HUMAN POPULATION AND THE ENVIRONMENT (9)

Population growth - variation among nations - Population explosion - Family welfare programme - Human rights - HIV/AIDS - women and child welfare - Role of information technology in environment and human health.

**TOTAL (L: 45) = 45 PERIODS**

*Approved by third Academic council*

**TEXTBOOKS:**

1. Anubha Kaushik and C.P. Kaushik, Environmental Science and Engineering, New Age International Publishers, New Delhi (2006)
2. "Elements of Environmental Science and Engineering", P.Meenakshmi, Prentice-Hall of India, New Delhi (2005).
3. Dr.A.Ravikrishnan, Environmental Science and Engineering., Sri Krishna Hitech Publishing co. Pvt .Ltd., Chennai, 13<sup>th</sup> Edition (2012).

**REFERENCES:**

1. Masters, Gilbert M, "Introduction to Environmental Engineering and Science", Second Edition, Pearson Education, New Delhi (2004).
2. Santosh Kumar Garg, Rajeshwari garg, smf Ranjni Garg "Ecological and Environmental Studies" Khanna Publishers, Nai Sarak, Delhi (2006).
3. Miller T.G. Jr., "Environmental Science", Tenth Edition, Wadsworth Publishing Co. (2004).

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x	x		x					x		x
2	x		x	x	x							x
3		x	x	x			x					x
4	x			x							x	x
5	x				x	x	x		x	x		x

**15IT201 - ADVANCED C & DATA STRUCTURES**  
**(Common to CSE & IT branches)**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To learn on the manipulation of pointers, structure, union and files.
- To understand the different methods of organizing large amounts of data.
- To efficiently abstract data types for linear and non-linear data structures.
- To efficiently implement solutions for specific problems.
- Critically analyse the various algorithms.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Understand the dynamics of memory by the use of pointers.
- CO2 Exemplify and implement how abstract data types such as stack, queue and linked list can be implemented to manage the memory using static and dynamic allocations.
- CO3 Understand and distinguish the conceptual and applicative differences in trees.
- CO4 Design various routing algorithms using appropriate data structures.
- CO5 Understand complex data structures like graph and its traversal.

**UNIT-I: ADVANCED C**

**(9)**

Pointer concepts-Pointers & Arrays, Structure concepts - Defining, Declaring, Accessing Member Variables, Structure within Structure - Union - File Management in C- Dynamic Memory Allocation.

**UNIT-II: LINEAR DATA STRUCTURES - LIST**

**(9)**

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists- circularly linked lists- doubly-linked lists – applications of lists – Polynomial Manipulation.

**UNIT-III: LINEAR DATA STRUCTURES – STACK, QUEUE**

**(9)**

Stack ADT – Evaluating arithmetic expressions- other applications- Queue ADT – circular queue implementation – Double ended Queues – applications of queues.

**UNIT-IV: NON LINEAR DATA STRUCTURES - TREE**

**(9)**

Definitions - Binary Trees - The Search tree ADT – Binary Search Trees – AVL Tree – Tree Traversals – Priority Queues (Heap) – Model – simple implementations – Binary Heap.

**UNIT-V: GRAPHS**

**(9)**

Definitions – Representation of graph – Graph traversal: Depth first search –Breadth first search – Topological Sort - Shortest Path Algorithm: Unweighted Shortest paths – Dijkstra's Algorithm- Minimum Spanning Tree: Prim's Algorithm – Kruskal's Algorithm.

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

1. Ashok.N.Kamthane, "Programming in C", Pearson Education (India), 2nd Ed., 2013. (Unit I).
2. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd ed., Pearson education Asia, 2002(Unit II to Unit V).

**REFERENCE BOOKS:**

1. F Richard, Gilberg and Behrouz A. Forouzan, "Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE, 1998.
2. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education Asia, 2004.
3. Yashavant Kanetkar, "Let us C", BPB publications, New Delhi, 3<sup>rd</sup> Ed., 2011.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x				x					
2	x	x					x		x		x	
3	x	x	x				x		x			
4	x	x	x				x					
5	x			x							x	x

**15MEC01- ENGINEERING GRAPHICS**  
**(Common to All Branches except MECH.)**

L	T	P	C
2	0	2	3

**OBJECTIVES:**

- To learn to take data and transform it into graphic drawings.
- To learn basic engineering drawing and standards related to technical drawing.
- To learn about 2D and 3D drawings.
- To understand and practice the drawings.
- To Familiar with specifications create drawings and layouts of a product.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Understand the concepts of Conics.
- CO2 Create the projection of point, straight line and plane
- CO3 Draw the drawing of various solids.
- CO4 Familiar with section of solids in different cutting planes
- CO5 Create drawings and layouts of a product in 3D.

**Concepts and Conventions:**

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning.

**UNIT I : GEOMETRICAL CONSTRUCTIONS AND PLANE CURVES (12)**

Geometrical constructions: Dividing a given straight line into any number of equal parts, bisecting a given angle, drawing a regular polygon given one side, special methods of constructing a pentagon and a hexagon Curves used in engineering practices: Conics - Construction of ellipse, Parabola and hyperbola by eccentricity method - Construction of cycloid - construction of involutes of squad and circle - Drawing of tangents and normal to the above curves.

**UNIT II : PROJECTION OF POINTS, LINES AND PLANE SURFACES (12)**

Projection of points and straight lines located in the first quadrant - Determination of true lengths and true inclinations - Projection of polygonal surface and circular lamina inclined to both reference planes

**UNIT III : PROJECTION OF SOLIDS (12)**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

**UNIT IV : SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES (12)**

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other - Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids - Prisms, pyramids, cylinders and cones- Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

**UNIT V : ISOMETRIC, PERSPECTIVE PROJECTIONS & BUILDING DRAWING (12)**

Principles of isometric projection - isometric scale - isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method.

Plan, elevation and section of single storied residential building with flat RCC roof and brick masonry walls having not more than 2 rooms. Free hand sketching in isometric projection.

**TOTAL (L:30+P:30) : 60 PERIODS**

**TEXT BOOK:**

1. Venugopal.K, PrabhuRaja.V, "Engineering Drawing+AutoCAD", 5<sup>th</sup> ed., Reprint, New Age International, 2011.

**REFERENCES:**

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
2. Natrajan.K.V, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2006.
3. Kumar.M.S, "Engineering Graphics", D.D. Publications, 2007.
4. Bhatt.N.D, "Engineering Drawing" Charotar Publishing House, 2011.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x	x		x	x	x	x		x
2	x	x		x	x		x	x	x	x		x
3	x	x		x	x		x	x	x	x		x
4	x	x		x	x		x	x	x	x		x
5	x	x		x	x		x	x	x	x		x

**15GY211 - PHYSICS AND CHEMISTRY LABORATORY- II**  
(Common to All Branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**OBJECTIVES:**

- To provide the basic practical exposure to all the engineering and technological streams in the field of physics. .
- To provide the basic practical exposure to all the engineering and technological streams in the field of chemistry.
- The students are able to know about the water containing impurities and some physical parameters.
- To gain the knowledge about properties of matter, semiconductors and solar cells
- To develop the knowledge of spectrophotometry.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Acquire the practical knowledge in various moduli.
- CO2 Gain the practical knowledge about band gap of a semiconductor and optoelectronic devices and Understand about the spectral instruments.
- CO3 Analyze the properties of matter and determine the thermal conductivity of a material.
- CO4 Apply knowledge of measurement of conductance, hardness producing ions, alkalinity, conductance, EMF and pH
- CO5 Understand the impact of water quality and to solve engineering problems

**LIST OF EXPERIMENTS:**

**PHYSICS LABORATORY- II**

1. Determination of Young's modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of viscosity of liquid – Poiseuille's method.
4. Spectrometer dispersive power of a prism.
5. Determination of Young's modulus of the material – uniform bending.
6. Torsional pendulum – Determination of rigidity modulus.
7. Solar cell – VI characteristics
8. V-I characteristics of PN junction diode.
9. Determination of thermal conductivity of a bad conductor – Lee's Disc method.

**CHEMISTRY LABORATORY- II**

1. Estimation of alkalinity of Water sample
2. Estimation of Copper in brass by EDTA
3. Conductometric titration of mixture of acids.
4. Estimation of iron by potentiometry.
5. Estimation of hydrochloric acid by pH metry.
6. Estimation of water of crystallization of copper sulphate.
7. Estimation of iron by spectrophotometer.

**TOTAL (P:60) = 60 PERIODS**

*Approved by third Academic council*

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x		x	x			x	x	
2	x	x		x			x					
3	x	x		x								
4	x	x		x		x	x					
5	x	x		x		x	x					

**15GY212 - SOFT SKILLS – II**  
**(Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**OBJECTIVES:**

- To re-engineer attitude and understand its influence on behaviour.
- To recognize stress symptoms & develop stress deflecting strategies.
- To improve time management, organizational skills and goal setting.
- To develop leadership skills to improve teamwork, creativity & productivity.
- To become self- confident individuals by mastering inter-personal skills, team management skills and leadership skills.

**COURSE OUTCOME:**

At the end of the course, the students will be able to

- CO1 Narrate stories by their own.
- CO2 Develop their leadership qualities for the betterment of the team.
- CO3 Acquire strategic knowledge about how to manage time.
- CO4 Overcome stress making factors in society.
- CO5 Know how to prepare Resume and write Report efficiently.

**UNIT I**

**(6)**

Effective presentation strategies – Story telling – Visual communication.

**UNIT II**

**(6)**

Team work – Importance of team work – Leadership skills – attributes of a successful team – barriers involved- dealing with people- Group decision making.

**UNIT III**

**(6)**

Life and Managerial skills – Effective ways of dealing with people – Emotional intelligence- Types of conflicts (Inter and Intra group conflicts).

**UNIT IV**

**(6)**

Time Management – Tips and strategies- Time wasters – Procrastination – Advantages of time management.

**UNIT V**

**(6)**

Stress management – Management of various forms of fear (examination fear, stage fear and public speaking fear).

**TOTAL (P:30) = 30 PERIODS**

**TEXT BOOK :**

1. Swaminathan. V.D & Kaliappan.K.V(2001), "Psychology for Effective Living", Chennai, The Madras Psychology Society.

**REFERENCE:**

1. Robbins, S.B.(2005). Organizational Behavior. New Delhi: Prentice Hall of India.
2. Smith, B (2004). Body Language. Delhi: Rohan Book Company.
3. Hurlock, E.B (2006). Personality Development, 28<sup>th</sup> Reprint. New Delhi: Tata McGraw Hill.

### Mapping of Course Outcomes (Cos) and Programme Outcomes (Pos)

Mapping of Cos and Pos												
Cos	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
1									x	x		x
2									x	x		x
3									x	x		x
4									x	x		x
5									x	x		x

**15IT211 DATA STRUCTURES LABORATORY**  
(Common to CSE & IT branches)

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

**OBJECTIVES :**

- To learn the manipulation of Structures, Unions and Pointers.
- To learn about linear and non-linear data structure.
- To efficiently abstract data types for linear and non-linear data structures.
- To efficiently implement solutions for specific problems.
- Critically analyze the various algorithms.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- C01 Implement dynamic memory allocation for structures and unions.
- C02 Device linear Data structure like list, stack and queue
- C03 Understand about evaluation of expressions.
- C04 Build and implement non-linear data structure, tree.
- C05 Design and implement non-linear data structure, graph and its traversal.

**LIST OF PROGRAMS:**

1. Program Using Structures and Unions
2. Program Using Pointers.
3. Implementation of singly linked list.
4. Implementation of Doubly linked list.
5. Implementation of Polynomial addition using List ADT.
6. Array implementation of Stack and Queue ADT.
7. Linked list implementation Stack and Queue ADT.
8. Implementation of stack applications:
  - a. Program for Balanced Parenthesis.
  - b. Program for Evaluating Postfix Expressions.
9. Implementation of Binary tree traversals.
10. Search Tree ADT - Binary Search Tree.
11. Implementation of Breadth First Search Techniques.
12. Implementation of Depth First Search Techniques.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x				x					x
2	x	x					x		x		x	x
3	x	x	x				x		x			x
4	x	x	x				x					
5	x		x				x					x

*Approved by third Academic council*

**15GYC11 ENGINEERING PRACTICES LABORATORY**  
**(Common to All Branches)**

L	T	P	C
0	0	4	2

**OBJECTIVES:**

- To provide hands on training on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
- To understand the basic working principle of electric components
- To understand and operate multimeter for current, voltage and resistance measurements
- Have and technical skills required to remain productive in the field of Electrical Engineering

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- C01 Understand various civil engineering practices like plumbing, carpentry and relevant tools
- C02 Understand various manufacturing processes and get familiarity with the instruments such as CRO, Function generator, single and dual power supply, multi-meter, bread board, IC's, and components such as diodes, transistors, resistors, capacitors, inductors, etc.
- C03 Get familiarity with the testing of capacitors, diodes, transistors with Analog multimeter or Digital multimeter.
- C04 Understand the principles of electrical circuits and electronics, and analysis, synthesis, and experimental techniques for both analog and digital electronic circuits.
- C05 Do residential house wiring and Measure energy and resistance to earth of electrical equipment.

**GROUP-A (MECHANICAL AND CIVIL ENGINEERING)**

**I - CIVIL ENGINEERING PRACTICE**

**(15)**

**Buildings:**

- a. Study of plumbing and carpentry components of residential and industrial buildings, Safety aspects.

**Plumbing Works:**

- a. Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
- b. Study of pipe connections requirements for pumps and turbines.
- c. Preparation of plumbing line sketches for water supply and sewage works.
- d. Hands-on-exercise:  
Basic pipe connections –Mixed pipe material connection – Pipe connections with different joining components.
- e. Demonstration of plumbing requirements of high-rise buildings.

**Carpentry using Power Tools only:**

- a. Study of the joints in roofs, doors, windows and furniture.
- b. Hands-on-exercise: Planning, Tee joints.

**II - MECHANICAL ENGINEERING PRACTICE**

**(15)**

**Welding:**

- a. Preparation of edges for welding and study of welding symbols.
- b. Arc welding- butt joints, lap joints and tee joints.
- c. Gas welding

- d. Study of standard size of bars, rods, sections, sheet metals.
- e. Study of work piece types and parameters of welding such as welding current, air gap, filler metal.

**Basic Machining:**

- a. Facing & Plain turning
- b. Drilling Practice
- c. Study of different types of screw drivers, screws, bolts and nuts.

**Sheet Metal Work:**

- a. Model making using bending and forming - Trays, cone.
- b. Study of thickness gauges, wire gauges.

**GROUP - B (ELECTRICAL AND ELECTRONICS)**

**ELECTRICAL ENGINEERING PRACTICE**

**(15)**

- a. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- b. Fluorescent lamp wiring.
- c. Stair case wiring
- d. Measurement of electrical quantities –voltage, current, power & power factor in RLC circuit.
- e. Measurement of energy using single phase energy meter.
- f. Measurement of resistance to earth of electrical equipment.

**ELECTRONICS ENGINEERING PRACTICE**

**(15)**

- a. Study of Electronic components and equipment –Resistor (Colour coding), Inductor, Capacitor.
- b. Measurement of AC signal parameter (peak-peak, RMS period, frequency) using CRO.
- c. Study of logic gates AND, OR, XOR and NOT.
- d. Study of Clock Signal.
- e. Soldering practice -Components Devices and Circuits –Using general purpose PCB.
- f. Study of HWR and FWR.
- g. Study of Telephone, FM Radio and Cell Phone.

**TOTAL (P:60) : 60 PERIODS**

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x				x	x		x				
2	x	x	x		x	x		x				
3	x				x	x		x				
4	x				x	x		x				
5	x				x	x		x				

**15MY302 FOURIER ANALYSIS , INTEGRAL TRANSFORMS & PARTIAL DIFFERENTIAL EQUATIONS**  
(Common to CSE & IT Branches)

L	T	P	C
3	2	0	4

**OBJECTIVES:**

- The course aims to impart analytical skills to the students in the areas of boundary value problems and transforms techniques.
- The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations.
- This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems?
- 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.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 Determine the behavior of the Fourier series at points of discontinuity using Dirichlet's boundary condition, use half range sine and cosine series, Parseval's Identity and perform harmonic Analysis of a discrete function.
- CO2 Form and solve first & higher order partial differential equation, Lagrange's equations.
- CO3 Solve one dimensional wave and heat equation separation of variables method and Fourier Series.
- CO4 Solve problems using Fourier integral theorem and convolution theorem.
- CO5 Develop Z-transform techniques for discrete time systems.

**UNIT I FOURIER SERIES**

(9)

Dirichlet's conditions – Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.

**UNIT II PARTIAL DIFFERENTIAL EQUATIONS**

(9)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types:  $f(p,q)=0$ , Clairut's form,  $f(x,p,q)=0$ ,  $f(y,p,q)=0$ ,  $f(z,p,q)=0$ , Separable Equation – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients (R.H.S = 0,  $e^{ax+by}$ ,  $\cos(ax + by)$ ,  $\sin(ax + by)$ ,  $x^r y^s$ ).

**UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**

(9)

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation (Zero and Non-Zero Boundary Conditions) – One dimensional heat equation (Reduced to Zero and Non-Zero temperature) – Steady state solution of two-dimensional heat equation (Finite and infinite Plate).

**UNIT IV FOURIER TRANSFORM**

(9)

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity–Finite Fourier Transform.

**UNIT V Z -TRANSFORM AND DIFFERENCE EQUATIONS****(9)**

Z transform: Standard Results – First Shifting theorem, Second Shifting theorem (Excluding Proof) – Initial and Final Value Theorem (Excluding Proof) – Inverse Z transform (Partial fraction method and Residue method) – Convolution theorem – Formation of difference equations – Solution of difference equations using Z transforms.

**TOTAL (L:45+T:30)=75 PERIODS****TEXT BOOKS:**

1. Grewal, B.S. "Higher Engineering Mathematics", 42<sup>nd</sup> ed., Khanna publishers, New Delhi, 2012.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics; Volume III", S. Chand & Co Ltd., 2006.

**REFERENCES:**

1. Veerarajan, T. "Engineering Mathematics (for III Semester)", 3<sup>rd</sup> ed., Tata Mc Graw Hill, New Delhi, 2005.
2. Goyal. Manish and Bali, N.P, "A Textbook of Engineering Mathematics", 6<sup>th</sup> ed., Laxmi Publication (P) Ltd. New Delhi, 2012.
3. Kreyszig, Erwin. "Advanced Engineering Mathematics", 9<sup>th</sup> ed., Wiley Publications, New Delhi, 2006.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x								
2					x		x	x				x
3											x	x
4		x										
5			x	x								x



## 15CS301 OPERATING SYSTEMS

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To learn about the basics of operating system hardware, peripherals and troubleshooting.
- To transfer knowledge about how the process scheduling work together to perform computing tasks.
- To learn the importance of memory in the operating system.
- To explore and demonstrate managing the disk and files of operating systems.
- To study advanced security, authentication and production techniques of operating system.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Identify the systematic approach of the system.
- CO2 Develop real-time operating systems for task scheduling.
- CO3 Work on design and development of disk and file related hardware.
- CO4 Know the real time meaning of security and production in the field of operating system.
- CO5 Analyze the working of memory related hardware.

### UNIT I FUNDAMENTALS

(9)

Introduction, System Architecture – Operating System Structure – Operations – Process management, Memory management – Storage management – System structure – User Operating System Interface, System Calls – Types, System Programs, Operating System Design and Implementation, Operating System Structure, Virtual Machines, Operating System Generation, System Boot.

### UNIT II PROCESS MANAGEMENT

(9)

Process Concept – Process Scheduling, Operations on Processes, Inter process Communication, Examples of IPC Systems, Communication in Client Server Systems; Process Scheduling – Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple – Processor Scheduling, Operating – System Examples, Synchronization – The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection.

### UNIT III MEMORY MANAGEMENT

(9)

Memory management hardware – Swapping, Paging, Segmentation, Page Replacement, Allocation of Frames, thrashing, Memory mapped files, Kernel Memory.

### UNIT IV SECONDARY STORAGE MANAGEMENT

(9)

Secondary Storage Structure – Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap Space Management, RAID Structure, Stable Storage Implementation; File System – File Concept, Access Methods, Directory and Disk Structure, File System Mounting; File System Implementation – structure, implementation, directory implementation, free space management; I/O Systems – I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations, STREAMS, Performance.

### UNIT V PROTECTION AND SECURITY

(9)

System Protection – Goals, principles, Domain, Access Matrix, Access Control; System Security – Problem, Threads, Cryptography, User Authentication, Implementing Security, Firewall, Computer Security Classification. Case Study: Linux, Windows and Android.

**TOTAL (L:45)= 45 PERIODS**

**TEXT BOOK:**

1. Silberschatz, P.B. Galvin and G. Gagne, "Operating system concepts", 9<sup>th</sup> edition, 2012.

**REFERENCE:**

1. W. Stallings, "Operating systems", 8<sup>th</sup> edition, Prentice-Hall, 2014.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x									x	
2	x	x	x			x	x				x	x
3	x		x					x			x	x
4	x	x	x							x	x	
5	x		x	x		x				x	x	x



## 15CS302 OBJECT ORIENTED PARADIGM AND PROGRAMMING

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To understand the principles of object oriented programming.
- To gain familiarity with the syntax, class hierarchy, environment and simple application construction for an object-oriented programming language.
- To learn generic programming concepts in C++.
- To get exposure on re-engineering for real time engineering applications.
- To impart exception handling and streams in building robust applications.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Apply principles of object oriented programming concepts in problem solving.
- CO2 Apprehend the syntax and semantics of the C++ programming language.
- CO3 Synthesize generic class templates to be used with different types of data for various applications.
- CO4 Design and create new applications by reusing the code.
- CO5 Deploy applications to handle the exceptions and input /output streams during runtime.

### UNIT I INTRODUCTION TO FUNDAMENTAL CONCEPTS OF OOP

(9)

Evolution of programming paradigms – Structured versus object-oriented development – Elements of Object Oriented Programming – Merits and demerits of object oriented programming – Structure of C++ program – Classes and Objects: Class specification – Objects – Accessing class members – Static members – Defining member functions – Passing and returning objects – Array of objects – Inline functions – Accessing member functions within class .

### UNIT II OBJECT CREATION AND MEMORY MANAGEMENT

(9)

Constructors – Parameterized constructors – Constructor overloading – Copy constructor – Destructors – Default arguments – Pointers and runtime binding – Dynamic Objects: Array of pointers to objects, Pointer to Object members – New, delete operators – “this pointer” – Friend class and friend function.

### UNIT III OVERLOADING AND GENERIC PROGRAMMING

(9)

Function overloading – Operator overloading – Non-overloadable operators – Unary operator overloading – Operator keyword – Limitations of increment/decrement operators – Binary operator overloading – Generic programming with templates – Function templates – Class templates.

### UNIT IV INHERITANCE

(9)

Inheritance – Base class and derived class relationship – Derived class declaration – Forms of inheritance – Inheritance and member accessibility – Constructors in derived class – Abstract class – Virtual functions – Pure virtual function.

### UNIT V EXCEPTION HANDLING AND STREAMS

(9)

Files and Streams – Opening and Closing a file – File modes – File pointers and their manipulation – Sequential access to a file – Random access to a file – Reading and Writing files – Exception handling – Exception handling model – Exception handling constructs – Handling uncaught exceptions – Exceptions in Inheritance Tree – Exceptions in Class Templates.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOK:**

1. K.R.Venugopal, Rajkumar and T.Ravishankar, "Mastering C++", second edition, Tata McGraw Hill, 2013.

**REFERENCES:**

1. T Budd, "An Introduction to Object-oriented Programming", third edition, Addison-Wesley, 2008.
2. Bjarne Stroustrup, "The C++ programming Language", fourth edition, Addison Wesley, 2013.
3. M Harvey, Deitel and Paul J. Deitel, "C++ How to Program", seventh edition, Prentice Hall, 2010.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x	x						x
2	x	x	x		x							x
3	x	x	x								x	
4	x	x	x	x								x
5	x	x	x	x	x				x			x



## 15CS303 DESIGN AND ANALYSIS OF ALGORITHMS

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To know the fundamental concepts and techniques for problem solving and algorithm design.
- To learn algorithms correctness using mathematical analysis.
- To be familiar with the important algorithm design techniques.
- To explain different sorting techniques such as heap sort, merge sort, and quick sort.
- To learn the different range of behaviors of algorithms, the notion of tractable and intractable problems.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Analyze worst, best and average case running times of algorithms using asymptotic notations.
- CO2 Use various computational models to measure and analyze recursive /non recursive algorithms.
- CO3 Develop simple logical solution to problem that needs exhaustive searching.
- CO4 Critically analyze the best sorting algorithm for any range of input.
- CO5 Design dynamic-programming algorithms and apply them to test for optimality.

### UNIT- I BASIC CONCEPTS OF ALGORITHMS

(9)

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

### UNIT II MATHEMATICAL ASPECTS AND ANALYSIS OF ALGORITHMS

(9)

Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.

### UNIT III BRUTE FORCE AND DECREASE- AND –CONQUER

(9)

Brute Force – Selection Sort and Bubble Sort – Sequential Search–Closest pair and convex – hull problems by brute force. Decrease and Conquer – Insertion Sort – Decrease-by-a-Constant-Factor Algorithms – Variable-Size – Decrease Algorithms.

### UNIT IV DIVIDE-AND -CONQUER AND TRANSFORM CONQUER

(9)

Divide and conquer – Merge sort – Quick Sort – Binary Search – Binary tree – Traversal and Related Properties. Transform and conquer – Presorting – Gaussian elimination-Heaps and Heap Sort – Horner's Rule and Binary Exponentiation.

### UNIT V DYNAMIC PROGRAMMING AND BACKTRACKING

(9)

Dynamic Programming – 0/1 Knapsack Problem – Optimal Binary Search trees – Warshall's and Floyd's Algorithm. Backtracking – N Queen's problem – Hamiltonian Circuit problem – Subset problem.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 3rd edition, 2012.

### REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x					x	x				
2	x	x	x	x			x				x	
3	x	x	x	x		x		x	x		x	
4	x	x	x	x		x		x	x		x	
5		x	x		x			x	x		x	



Approved by Fourth Academic council

## 15CS304 MICROPROCESSORS AND MULTICORE PROGRAMMING

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### OBJECTIVES :

- To introduce fundamentals of 8086 architecture.
- To acquire knowledge on assembly language programs.
- To understand different peripheral devices.
- To learn about architecture and design.
- To know the Multicore thread.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Explain the basic architecture of 8086.
- CO2 Write the assembly language programs.
- CO3 Employ the peripheral interfacing.
- CO4 Describe the multicore architecture.
- CO5 Portray the various multicore threads.

### UNIT I 8086 ARCHITECTURE

(9)

Introduction to Microprocessor – Architecture – Minimum and Maximum mode operations of 8086 – Addressing modes – Instruction set.

### UNIT II ASSEMBLY LANGUAGE PROGRAMMING OF 8086

(9)

Assembler Directives – Simple Programs using Assembler – Macro Procedures – ALP using FOR Loop, WHILE, REPEAT and IF-THEN-ELSE – Features–Interrupts–Interrupt Programming – BIOS–DOS.

### UNIT III PERIPHERALS AND INTERFACING

(9)

Peripherals & Interfacing With 8086 – Serial & parallel I/O (8251A and 8255) – Programmable interval timer (8253) – Programmable DMA controller (8257) – programmable interrupt controller (8259A) – Keyboard and display controller (8279).

### UNIT IV MULTICORE ARCHITECTURE AND DESIGN

(9)

Introduction to Multicore – Multicore Architectures – The Software Developer's Viewpoint – The Bus Connections – Single Core to Multicore – The AMD Multicore Opteron – The Sun UltraSparc T1 Multiprocessor – Intel Core 2 Duo Processor– Intel's PCI Express – Core 2 Duo's Instruction Set.

### UNIT V MULTITHREADING AND CHALLENGES

(9)

Introduction to Thread – Comparing Threads to Processes – Setting Thread Attributes – The Architecture of a Thread – Challenges of multicore programming.

**TOTAL(L:45) : 45 HOURS**

### TEXT BOOKS:

1. A.K. Ray and K.M. Bhurchandi "Advanced Microprocessors and Peripherals" , 2nd edition, Tata McGraw Hill, 2013.
2. Cameron Hughes Tracey Hughes "Professional Multicore Programming Design and Implementation for C++ Developers" , 2009, Wiley Publishing, Inc.

**REFERENCES:**

1. Douglas V. Hall, "Microprocessors and Interfacing Programming and Hardware". Tata McGraw Hill, 2007.
2. K Uday Kumar, B S Umashankar, Advanced Micro processors & IBM-PC Assembly Language Programming, Tata McGraw Hill, 2003
3. Peter Abel, IBM PC Assembly language & Programming, PHI, 5th Edition, 2001.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x									x
2	x	x	x					x				x
3	x		x		x						x	x
4	x	x	x					x				x
5	x		x								x	x



## 15CS305 COMPUTER NETWORKS

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To have a theoretical foundation and a good ability in computer networks.
- To build a fundamental knowledge frame about wide area networking.
- To make good preparation for applying the Local networking fundamental.
- To gain knowledge of network management, network programming, network information process and network security.
- To provide an overall network engineering techniques under the wireless discipline.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Understand the basic networking technologies.
- CO2 Implement LAN and WAN networking.
- CO3 Master in the technology management skills and security.
- CO4 Build up a clear concern on the networking management.
- CO5 Work with wired communication and wireless communication.

### UNIT I COMMUNICATIONS NETWORK PROTOCOLS (9)

Communications Model, Data communication, Networks, Network protocol (syntax, semantics, and timing); Protocol architecture – OSI – TCP/IP; Transmission media; Overview of data(analog & digital), signal(analog & digital), transmission (analog & digital)& transmission media ( guided & non-guided); TDM, FDM, WDM; Time division & space division switch, TDM bus; Telephone network.

### UNIT II WIDE AREA NETWORKS (9)

Switching – Circuit Switching, Network, Concept, Packet switching, Concept, Frame relay, Cell switching – ATM cell switching, Routing in switched networks – Example – LC algorithm.

### UNIT III LOCAL AREA NETWORKS (9)

LAN topologies (bus, ring, star), LAN protocol architecture, bridges; High speed LAN – Ethernet, Fiber channel; Wireless LAN – Technology, Architecture, Services, Medium Access Control, Physical layer, Security considerations.

### UNIT IV NETWORK MANAGEMENT AND PERFORMANCE ANALYSIS OF NETWORKS (9)

Network management system – Configuration management, Fault management, Performance management, Security management, Accounting management; Simple Network Management Protocol (SNMP) – Concept, management components, Structure of management information, Management Information Base (MIB), Network security – Concepts, Attacks, Threats, Intruders, Malicious software, Virus, Worms, Bots, Firewall, Intrusion detection, Malware defense.

### UNIT V ADVANCED COMPUTER NETWORKS (9)

Mobile computing – Mobile computing vs wireless networking, mobile computing application, characteristics, structure, MAC protocol – wireless MAC issues, Fixed assignment schemes, random assignment schemes, reservation based scheme.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. W. Stallings, "Data & Computer Communications", 9th ed., Prentice-Hall, 2010.
2. Prasanth kumar pattnaik, Rajib mall, "Fundamentals of mobile computing", PHI Learning PVT., LTD, New Delhi-2012.
3. Behrouz A Forouzan, " Data Communications and Networking", Tata Mc- grawhill, 2007.
4. S. Tanenbaum, "Computer networks", 5 th ed., Prentice-Hall, 2010.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									x
2	x	x	x	x								x
3	x		x								x	
4	x	x	x									x
5	x	x	x						x			x



## 15CS311 OPERATING SYSTEMS LABORATORY

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To learn the files which support operating systems, basic computing fundamentals, and appropriate behavior while using technology.
- To understand the various scheduling methods with its real time application.
- To learn the complex operating system problem with simulation tools.
- To replicate the concept of deadlock.
- To know the process concept and inside operation of operating system.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Display basic commands and CPU utilization.
- CO2 Explore the knowledge to solve basic scheduling problems.
- CO3 Simulate the operating system processing.
- CO4 Identify components and peripherals of operating systems including input-output devices.
- CO5 Able to create new process for operating systems

### LIST OF EXPERIMENTS

1. Study the basic shell commands in Linux.
2. Program to report the behavior of the OS to get the CPU type & model and kernel version.
3. Program to get the amount of memory configured into the computer, amount of memory currently available.
4. Implement the various process scheduling mechanisms such as FCFS, SJF, Priority, round – robin.
5. Implement the solution for reader – writer's problem.
6. Implement the solution for dining philosopher's problem.
7. Implement Banker's algorithm.
8. Implement the program to simulate deadlock detection
9. Write a program to create processes and threads.

**TOTAL (P:30) = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x								x
2	x	x	x	x				x				x
3	x		x	x					x			x
4	x	x	x	x							x	x
5	x	x		x								



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## 13CS312 OBJECT ORIENTED PROGRAMMING LABORATORY

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To understand the principles of object oriented programming.
- To gain familiarity with the syntax, class hierarchy, environment and simple application construction for an object-oriented programming language.
- To learn generic programming concepts in C++.
- To get exposure on re-engineering for real time engineering applications.
- To impart exception handling and streams in building robust applications.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Apply principles of object oriented programming concepts in problem solving.
- CO2 Apprehend the syntax and semantics of the C++ programming language.
- CO3 Synthesize generic class templates to be used with different types of data for various applications.
- CO4 Design and create new applications by reusing the code.
- CO5 Deploy applications to handle the exceptions and input /output streams during runtime.

### LIST OF EXPERIMENTS

1. Program to illustrate the function overloading feature.
2. Program to illustrate the concept of operator overloading.  
(Ex: Binary operators, Unary operators, New and Delete operators etc.)
3. Program to illustrate the use of following functions:
  - a) Friend functions
  - b) Inline functions
  - c) Static Member functions
  - d) Functions with default arguments.
4. Program to illustrate the use of destructor and the various types of constructors  
(No arguments, constructor, constructor with arguments, copy constructor etc).
5. Program for Dynamic Memory Allocation using new and delete operator
6. Program to illustrate the various forms of inheritance: Ex. Single, Multiple, multilevel, Hierarchical inheritance etc.
7. Write a program having STUDENT as an abstract class and create many derived classes such as Engineering, Science, Medical, etc. from the class STUDENT. Create their objects and process them.
8. Program to illustrate the use of virtual functions.
9. Program to illustrate the use of virtual base class.
10. Program to illustrate the use of templates.
11. Program to illustrate file handling operations:
  - a) Copying text files
  - b) Displaying contents of the file.
12. Program to illustrate how exceptions are handled  
(Ex: division-by-zero, overflow and underflow in stack etc.)

**TOTAL (P:30) = 30 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x	x						x
2	x	x	x		x							x
3	x	x	x								x	
4	x	x	x	x								x
5	x	x	x	x	x				x			x



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## 15CS313 COMPUTER NETWORKS LABORATORY

L	T	P	C
0	0	4	2

### OBJECTIVES:

- To make students get familiarized with different protocols and its services.
- To know the different kind of network components and its purpose
- To work with advanced network analyzer tools in real time.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Understand the server and client relationship.
- CO2 Learn the protocols related terms in the program.
- CO3 Recognize the packet system and protocol layers of a network stack.
- CO4 Implement simple client server model.
- CO5 Use modern technology in the field of network.

### LIST OF EXPERIMENTS

1. Write a program to display the server's date and time details at the client end.
2. Write a program to display the client's address at the server end.
3. Write a program to develop a chat application using TCP/ UDP protocol..
4. Write a program to capture each packet and to examine its checksum field.
5. Network tools and settings (to be done with only computer):
  - a. Familiarization with Networking cables (CAT5, UTP), Connectors (RJ45, T-connector), Hubs, Switches
  - b. Configuration of IP addresses , Subnet mask, Gateway
  - c. Setting up LAN
  - d. Connecting two or more different LAN with different subnet mask
  - e. Making computer to work like router/gateway with the help of IP address
6. Protocol analyzer using ethereal
  - a. Capturing and analyzing Ethernet frames
  - b. HTTP GET/response interaction
  - c. Analysis of ICMP and Ping
  - d. Analysis of ICMP and Trace route
  - e. Capturing a bulk TCP transfer from your computer to a remote server
7. Using simulator (NS3, GNS3, mininet & etc)
  - a. Go Back N
  - b. Selective Repeat
  - c. ARP Server/Client
  - d. RARP Server/Client

**TOTAL (P:60) = 60 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x							x
2	x	x		x				x				
3	x	x	x		x		x					x
4	x	x	x	x	x	x	x	x				x
5	x	x			x							



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## 15GYC12- SOFT SKILLS – LISTENING AND SPEAKING

L	T	P	C
0	0	2	0

### OBJECTIVES:

- To recollect the functional understanding of basic grammar and its structure.
- To acquire the listening skills through note completion, matching and multiple choice modes
- To develop speaking skills through self-introduction, short talk and topic discussion.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Apply the knowledge of basic grammar to classify the types of verbs and questions and to construct the sentences
- CO2 Develop the listening skills through note completion, matching and multiple choice modes
- CO3 Organize a presentation on the given topic.

### UNIT I GRAMMAR

(10)

Tenses – Verb (Auxiliary and Modal) – ‘Yes/No’ Type Questions – Reported Speech – Gerund – Phrasal Verbs

### UNIT II LISTENING

(10)

Part I: Note completion

Part II: Matching

Part III: Multiple Choice

### UNIT III SPEAKING

(10)

Part I: Self-Introduction

Part II: Short Talk on Business Topics

Part III: Topic Discussion in Pairs

**TOTAL (P:30) = 30 PERIODS**

### REFERENCES:

1. Murphy, Raymond, "Essential Grammar in Use", Cambridge University Press, UK, 2007.
2. Whitby, Norman, "Business Benchmark Pre- Intermediate to Intermediate Preliminary", Cambridge University Press, Second Edition, 2013

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1										x		x
2									x	x	x	x
3									x	x	x	x



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**15MY404 PROBABILITY AND QUEUEING THEORY**  
**(Use of Normal Distribution Table is permitted)**  
**(Common to CSE & IT Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

**OBJECTIVES:**

- Acquire knowledge of the random variable and manipulate some standard distributions.
- Queuing theory provides models for a number of situations that arise in real life.
- To understand and conduct computer systems modeling and performance analysis.
- To introduce the basic probability tools and concepts this is useful in modeling, such as Markov models and queuing theory.
- To provide necessary mathematical support and confidence to tackle real life problems.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 Have a fundamental knowledge of the basic probability concepts.
- CO2 Have a well-founded knowledge of standard distributions which can describe the real life Phenomena.
- CO3 Acquire skills in handling situations involving more than one random variable and functions of random variables.
- CO4 Understand and characterize phenomena which evolve with respect to time in a Probabilistic manner.
- CO5 Identify and analyze appropriate queuing model to reduce the waiting time in Queue.

**UNIT I PROBABILITY-ONE DIMENSIONAL RANDOM VARIABLE (9)**

Axioms of Probability – conditional Probability –Total Probability – Baye's Theorem – Random variable – Probability mass function – Probability density function – Properties – Moments.

**UNIT II STANDARD DISTRIBUTIONS (9)**

Discrete distributions: Binomial, Poisson and Geometric – Continuous distribution: Uniform, Exponential and normal distributions and its properties.

**UNIT III TWO DIMENSIONAL RANDOM VARIABLES (9)**

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Regression – Transformation of random variables.

**UNIT IV RANDOM PROCESS AND MARKOV CHAIN (9)**

Classification-Stationary process – Poisson process-Markov Chain –Transition probabilities – Limiting distributions.

**UNIT V QUEUEING THEORY (9)**

(M/M/1):(∞ /FIFO),(M/M/C):(∞ /FIFO),(M/M/1):(n /FIFO), (M/M/C):(n/FIFO)-(M/G/1)queue - Pollaczek - Khintchine Formula.

**TOTAL (L:45 + T:30) = 75 PERIODS**

**TEXT BOOKS:**

1. Ibe, C. Oliver, "Fundamentals of Applied Probability and Random Processes", Elsevier, New Delhi, 2009.
2. Gross, Donaldand Harris, M. Carl, "Fundamentals of Queuing Theory", Wiley Publications, New Delhi, 2009.
3. Veerarajan.T, "Probability, Statistics and Random Processes", Second Edition Tata McGraw-Hill, New Delhi, 2006.

**REFERENCES:**

1. Allen, O. Arnold, "Probability, Statistics and Queuing Theory with Computer Applications", 2nd Ed. Elsevier, New Delhi, 2009.
2. Taha, H.A., "Operations Research - An Introduction", 8<sup>th</sup> Ed. Pearson Education, New Delhi, 2008.
3. Trivedi, S.K., "Probability and Statistics with Reliability, Queuing and Computer Science Applications", 2<sup>nd</sup> Ed. John Wiley & Sons, New Delhi, 2002.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x	x	x	x			x			
2	x		x	x		x			x			x
3	x	x		x				x				x
4	x	x	x	x			x					x
5	x	x	x	x		x	x	x				



## 15CS401 DATABASE SYSTEMS

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### OBJECTIVES:

- To know the fundamentals of data models.
- To learn about Relational database architecture and querying through SQL.
- To know about normalization.
- To understand the storage structures and the queries processing/optimization.
- To gain knowledge about transaction processing, concurrency control and recovery.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Identify suitable data models for real time application and conceptualize a database system using ER Diagram.
- CO2 Write queries in relational algebra and SQL.
- CO3 Normalize the database design.
- CO4 Choose storage structure and process/optimize Queries.
- CO5 Apply concepts of query processing, transaction processing, and concurrency control.

### UNIT I DATA BASE SYSTEM CONCEPT (9)

Purpose of Database systems – Views of data – Database Languages - Database design – Database system architecture – Data models – Data Dictionary – Database Administration – Entity-Relationship model.

### UNIT II RELATIONAL DATABASE (9)

Structure of Relational Database – Integrity Constraints – Relational Algebra – Relational Calculus – SQL – Views – Joins – Functions and Procedures – Triggers.

### UNIT III DATABASE DESIGN (9)

Functional Dependencies – Decomposition: Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

### UNIT IV PHYSICAL DATABASE DESIGN AND QUERY PROCESSING (9)

Storage and file structure – Indexing and Hashing – Query Processing – Query Optimization.

### UNIT- V TRANSACTION PROCESSING (9)

Transactions: Desirable properties of Transactions – Serializability – Concurrency Control: Lock-Based Protocols – Timestamp-Based Protocols – Validation-Based Protocols – Recovery systems.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Sixth Edition, McGraw Hill, 2011.

### REFERENCES:

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x			x					x	x
2	x	x	x		x	x	x			x	x	x
3	x	x		x						x		x
4	x	x		x						x		x
5		x		x	x					x	x	x



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## 15CS402 JAVA PROGRAMMING

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To impart the fundamental concepts of core JAVA.
- To gain exposure about packages and collection Interfaces.
- To learn about exception handling and multithreading concepts
- To get knowledge about building Event Handling applications using AWT and SWING.
- To build applications using Networking and JDBC concepts.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Solve basic design problems using object oriented concepts.
- CO2 Write JAVA applications using packages and Collection Interfaces to build real time applications.
- CO3 Implement the robust and multitasking applications using exception handling and multithreading concepts
- CO4 Develop the simple GUI interfaces to interact with users and real time applications.
- CO5 Deploy the real time engineering applications using networking and JDBC concepts.

### UNIT I INTRODUCTION

(9)

Features of Java – Data types – Operators – Arrays – Control Statements – Classes – Objects – Methods – Constructors – Method Overloading – Garbage Collection – Inheritance – Using Super – Method Overriding – Abstract Classes – Using final with variable, class and method – String Handling – String class methods – String Buffer class – String Builder class – String Tokenizer class.

### UNIT II PACKAGES & INPUT / OUTPUT OPERATIONS

(9)

Java I/O – Packages – Interfaces – Assertions - Exploring java.util Package – Collection Interfaces – Collection Classes – Exploring java.io Package – File – Byte Streams – Character Streams – Java Serialization – Simple type wrappers – Using clone() and the Cloneable Interface.

### UNIT- III EXCEPTION HANDLING AND THREADS

(9)

Fundamentals – Compile time errors – Run time errors – Exception types – try catch block – Multiple catch statement – Nested try – Throw – Finally – User defined exceptions. Java threads – Priorities – Synchronization – Thread class and Runnable interfaces – Creating threads – Multiple threads – Inter thread communication.

### UNIT - IV APPLETS & SWING

(9)

Applet Basics – Applications using Applets – AWT classes – Frames – Graphics – AWT controls – Layout managers – Event Hierarchy – Event handling in AWT – Swing – Model-View-Controller Design Pattern – Swing Components – Event Handling in SWING Programming examples.

### UNIT- V NETWORKING & JAVA DATABASE CONNECTIVITY

(9)

Networking: Basics – NIO channels – Socket overview – TCP/IP client sockets – TCP/IP server sockets – URL – URL Connection – URI – Datagram sockets. JDBC: Manipulating Database with JDBC – Connecting to and querying the database – RowSet Interface – Prepared Statements and Stored Procedures – Transaction Processing.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Patrick Naughton and Herbert Schildt, "Java 2-The Complete Reference", Ninth Edition, Tata McGrawHill, New Delhi, 2014.

**REFERENCES:**

1. H.M. Deitel and P.J. Deitel, "JAVA™ How to program", 9<sup>th</sup> edition., Pearson Education, 2009.
2. George Reese, "Database Programming with JDBC & Java", 2<sup>nd</sup> edition., O'Reilly Media, 2000.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x							
2	x	x	x	x								x
3	x	x	x		x							x
4	x	x	x	x							x	x
5	x	x	x								x	x



## 15CS403 COMPUTER ARCHITECTURE AND ORGANIZATION

(Common to CSE & IT Branches)

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To understand the basic structure of digital computer.
- To study the design of arithmetic and logic unit and implementation of fixed point and Floating-point arithmetic operations.
- To perceive knowledge about internal and external memory technologies.
- To know the different kinds of I/O interfaces.
- To learn about Processing and pipelining

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Define the Purpose of functional units of the System.
- CO2 Solve basic binary math operation.
- CO3 Understand the variety of memory technologies.
- CO4 Apply the appropriate interfacing techniques for the project.
- CO5 Describe the instruction execution and Pipelining concepts.

### UNIT – I BASIC STRUCTURE OF COMPUTERS

(9)

Functional Units – Basic Operational Concepts – Bus Structures – Performance and Metrics – Instructions and Instruction Sequencing – Software – Memory Operations – Instruction Set Characteristics and Functions – Addressing Modes – RISC – CISC.

### UNIT - II COMPUTER ARITHMETIC

(9)

Data Representation – Hardware and Software Implementation of Arithmetic Unit for Common Arithmetic Operations: Addition, Subtraction, Multiplication, Division (Fixed point and floating point) – Design of Fast Address.

### UNIT- III MEMORY SYSTEM

(9)

Basic Concepts – Semiconductor RAM – ROM – Speed – Size and Cost – Cache Memories – Improving Cache Performance – Virtual Memory – Memory Management Requirements –Secondary Storage Devices.

### UNIT - IV I/O ORGANIZATION

(9)

Accessing I/O Devices – Programmed Input/output – Interrupts – Direct Memory Access – Buses – Interface Circuits – Standard I/O Interfaces (PCI, SCSI, USB) – Computer Peripherals.

### UNIT- V PROCESSING UNIT AND PIPELINING

(9)

Fundamental Concepts – Execution of Complete Instruction – Hardware Control – Micro Programmed Control – Pipelining Basic Concepts – Data Hazards – Instruction Hazards – Data Path and Control Considerations – Superscalar Operations – Performance Considerations.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2011.

**REFERENCES:**

1. William Stallings, "Computer Organization and Architecture – Designing for Performance", International Edition, Pearson Education, 2013.
2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Fifth Edition, Elsevier, 2014.
3. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x						x			x
2	x	x	x						x		x	x
3	x		x				x	x	x			x
4	x	x	x	x	x							x
5	x	x		x		x						x



## 15CS404 MOBILE COMPUTING

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To understand the basic concepts of mobile computing.
- To be familiar with the network protocol stack.
- To learn the basics standards of mobile telecommunication system.
- To understand Ad- Hoc networks.
- To gain knowledge about different mobile platforms and application development.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Explain the basics of mobile telecommunication system
- CO2 Choose the required functionality at each layer for given application
- CO3 Identify different standards of mobile communication systems
- CO4 Use simulation tools and design Ad hoc networks
- CO5 Develop a mobile application.

### UNIT I INTRODUCTION

(9)

Overview of Mobile Technologies – Cell Phone Systems – Wireless Networking Standards – Wireless LAN Architecture – Applications of Wireless LAN – Advantages of Wireless LAN over Wired LAN .

### UNIT II MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER

(9)

Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – Route Optimization – Overview of TCP/IP – Architecture of TCP/IP – Adaptation of TCP Window – Improvement in TCP Performance.

### UNIT III MOBILE TELECOMMUNICATION SYSTEM

(9)

Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).

### UNIT IV MOBILE AD – HOC NETWORKS

(9)

Ad- Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular Ad Hoc networks ( VANET) – MANET Vs VANET – Security .

### 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 mobile – Mobile Commerce – Structure – Pros & Cons – Mobile Payment System – Security Issues.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd, New Delhi – 2012.

**REFERENCES:**

1. Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
4. William.C.Y.Lee,"Mobile Cellular Telecommunications– Analog and Digital Systems", Second Edition,Tata Mc Graw Hill Edition ,2006.
5. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.
6. Android Developers : <http://developer.android.com/index.html>
7. Apple Developer : <https://developer.apple.com/>
8. Windows Phone Dev Center : <http://developer.windowsphone.com>

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x				x						x
2	x	x	x			x						
3			x	x	x							
4			x	x	x							x
5	x					x			x			x



## 15CS405 SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

### OBJECTIVES:

- To provide an overview of software engineering and software process models.
- To collect and analyze the user requirement using UML.
- To understand the different design techniques and software architectural styles.
- To learn various testing and maintenance measures for software products.
- Design and develop correct and robust software products that assure quality and reliability.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Develop a software process, based on knowledge of widely used models.
- CO2 Prepare SRS document and build requirement model.
- CO3 Identify and apply appropriate software architectures and patterns to carry out high level system design.
- CO4 Formulate and employ different testing strategies.
- CO5 Evaluate quality of the requirements, analysis and design work.

### UNIT I THE PROCESS MODELS

(9)

Software Engineering the nature of Software – Software Process Models: Waterfall Model – Incremental process models – Evolutionary process models: Prototyping – Spiral model – Concurrent model – Introduction to Agile process – Metrics in the Process and Project Domains – Software Measurement – Metrics for Software Quality.

### UNIT II REQUIREMENT ANALYSIS

(9)

Requirement Engineering – Establishing the groundwork – Eliciting requirements – Developing Use cases – Building the requirements model – Requirements analysis – UML Model that supplements the Use Case. Software Project Estimation – Decomposition Techniques – Empirical Estimation Models – The Make/Buy Decision.

### UNIT III DESIGN CONCEPTS AND PRINCIPLES

(9)

The Design concepts – The Design model – Architectural design – User interface design: user analysis and design, Interface analysis, Interface design steps – Requirements modeling: Flow Oriented Modeling – Software Risk Management – Coding principles.

### UNIT IV SOFTWARE TESTING TECHNIQUES

(9)

Software Testing Fundamentals – Internal and External views of testing – White-Box Testing – Basic Path Testing – Control Structure Testing-Black Box Testing – Software Testing Strategies – A Strategic Approach to Software Testing – Unit Testing- Integration Testing – Validation Testing – System Testing – The Art of Debugging.

### UNIT V SOFTWARE QUALITY ASSURANCE

(9)

Elements of Software Quality Assurance – SQA Tasks, Goals and Metrics – Software Review Techniques: Informal reviews – Formal Technical Reviews – Software Reliability – Software Configuration Management – The SCM Process – Version Control – Change Control – Configuration Audit.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Roger S.Pressman, "Software Engineering: A Practitioner's Approach", McGraw Hill International Edition, Eighth Edition, 2014.

**REFERENCES:**

1. Ian Sommerville, "Software Engineering", 8th Edition, Pearson Education, 2008.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", 5th Edition, Springer Verlag, 2001.
3. James F Peters and Witold Pedrycz, "Software Engineering – An Engineering Approach", 4th Edition, John Wiley and Sons, New Delhi, 2000.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x						x	x		x	
2	x	x	x			x					x	x
3	x	x	x			x			x		x	x
4	x	x	x			x		x	x	x	x	x
5	x	x	x					x	x	x	x	x



## 15CS411 DATABASE SYSTEMS LABORATORY

L T P C  
0 0 4 2

### OBJECTIVES:

- To design a database system.
- To study the usage of DDL and DML commands.
- To learn about joins, views, various built in functions.
- To work with data base connectivity.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- C01 Define database with various integrity constraints.
- C02 Working with various DML queries.
- C03 Create various views and make use of various types of joins.
- C04 Do conceptual design using E-R model and normalize the design.
- C05 Work with real time data base connectivity.

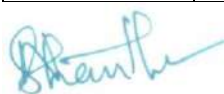
### LIST OF EXPERIMENTS

1. Data Definition Language (DDL) commands in RDBMS.
2. Implementing constraints to table design.
3. Data Manipulation Language (DML) and Data Control Language (DCL).
4. Test all the arithmetic functions and character functions.
5. Test all the date functions.
6. Implementation of Views.
7. Implement various Join operations.
8. Database design using E-R model and Normalization.
9. Implement Functions and Procedures.
10. Design and implementation of real time application(Payroll, Banking, Student information, Library information system).

**TOTAL (P:60) = 60 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x								x	x
2	x	x	x								x	x
3	x		x								x	x
4		x		x					x		x	x
5			x						x		x	



Approved by Fourth Academic council

## 15CS412 JAVA PROGRAMMING LABORATORY

L	T	P	C
0	0	2	1

### OBJECTIVES:

- To impart the fundamental concepts of core JAVA.
- To gain exposure about packages and collections Interfaces.
- To learn about exception handling and multithreading concepts
- To get knowledge about building Event handling applications using AWT and SWING.
- To build applications using Networking and JDBC concepts.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Solve basic design problems using object oriented concepts.
- CO2 Write JAVA applications using packages and Collection Interfaces.
- CO3 Implement the robust and multitasking applications using exception handling and multithreading concepts
- CO4 Develop the simple GUI interfaces to interact with users and other external applications.
- CO5 Deploy the real time engineering applications using networking and JDBC concepts.

### LIST OF EXPERIMENTS:

1. Programs to illustrate the concepts of overloading and overriding methods in JAVA.
2. Programs to implement the various forms of inheritance (For Single, Hierarchical, Multilevel inheritance,).
3. Program for manipulating strings using string tokenizer class.
4. Programs using interfaces in JAVA.
5. Programs to create packages in JAVA.
6. Program to apply assertion concept.
7. Programs which illustrates the use of files and streams
8. Program using java serialization concept.
9. Programs to apply exception handling in various applications.
10. Programs to create multiple threads in JAVA.
11. Programs to write applets to draw the various shapes.
12. Programs to create event driven applications using AWT and SWING components.
13. Programs to build real time applications using JDBC.
14. Program to implement networks applications (Chat Application, TCP/UDP )

**TOTAL (P:30) = 30 PERIODS**

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x							
2	x	x	x	x								x
3	x	x	x		x							x
4	x	x	x	x							x	x
5	x	x	x								x	x



Approved by Fourth Academic council

## 15CS413 MOBILE COMPUTING LABORATORY

L	T	P	C
0	0	4	2

### OBJECTIVES:

- To know the components and structure of mobile application development frameworks for Android and Windows OS based Mobiles.
- To learn how to work with various mobile application development frameworks.
- To be familiar with the capabilities and limitations of mobile devices.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- C01 Understand the fundamentals and various computational processing of mobile applications
- C02 Apply specifications and functionalities of various protocols/ standards of mobile applications.
- C03 Implement the design using Android SDK and using Objective C and iOS.
- C04 Design and Implement various mobile applications using emulators.
- C05 Deploy applications to hand-held 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. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement Multi-threading application.
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Create a mobile alarm clock application.

**TOTAL (P:60) : 60 PERIODS**

### LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

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

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x		x			x	x
2	x	x	x	x				x			x	
3	x		x	x					x		x	x
4			x	x					x		x	x
5			x	x					x		x	x



Approved by Fourth Academic council

## 15GYC13 - SOFT SKILLS – READING AND WRITING

L T P C  
0 0 2 0

### OBJECTIVES:

- To recollect the functional understanding of parts of speech and basic grammar
- To acquire the reading skills through cloze texts, matching and multiple choice modes
- To enhance the writing skills for a variety of purposes

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Apply the knowledge to identify the parts of speech and construct the sentences.  
CO2 Develop the reading skills through cloze texts, matching and multiple choice modes.  
CO3 Interpret effectively through writing for a variety of purposes.

### UNIT I: GRAMMAR

(10)

Articles – Adjectives – Conjunctions – Prepositions – Idioms & Phrases

### UNIT II: READING

(10)

- Part I: Matching 7 sentences to four short texts  
Part II: Text with sentences missing  
Part III: Text with multiple choice questions  
Part IV: Text with multiple choice gaps  
Part V: Identification of additional unnecessary words in text

### UNIT III: WRITING

(10)

- Part I: E-mail writing, Writing short notes, Memo, Agenda & Minutes  
Part II: Report Writing, Complaint Letter, Writing Proposals

**TOTAL (P:30) = 30 PERIODS**

### REFERENCES:

1. Murphy, Raymond, "Essential Grammar in Use", Cambridge University Press, UK, 2007.
2. Whitby, Norman, "Business Benchmark Pre- Intermediate to Intermediate Preliminary, Cambridge University Press, Second Edition, 2013

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x					x	x		x	x		
2	x					x	x		x	x		
3							x		x			



**15MY501 DISCRETE MATHEMATICS**  
**( Common to CSE and IT Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>2</b>	<b>0</b>	<b>4</b>

**OBJECTIVE:**

- To understand the basic concepts of logic and their applications.
- These discrete structures include logic, predicate calculus.
- Be exposed to concepts and properties of set theory and functions.
- The general counting methods involve permutations and combinations. These methods are very useful in constructing computer programs and in mastering many theoretical topics of computer science.
- Understand the concepts of the basic graph theory.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Rephrase real world statements as logical propositions and demonstrate whether the proposition is satisfiable, tautology or a contradiction.
- CO2 Infer whether a logical argument is valid from the given set of premises by applying the inference rules of predicate calculus
- CO3 Show mathematical reasoning and arrive at conclusions about sets and relations
- CO4 Construct the number of arrangements and selections using the principles of counting.
- CO5 Apply graph theory models of data structures & state machines to solve problems of connectivity & constraint satisfaction.

**UNIT I PROPOSITIONAL CALCULUS (9+3)**

Propositions-Logical connectives-Compound propositions-Conditional and biconditional propositions-Truth tables-Tautologies and Contradictions-Logical and Equivalences and implications-DeMorgan's Laws-Normal forms-Rules of inference-Arguments-Validity of arguments.

**UNIT II PREDICATE CALCULUS (9+3)**

Predicates-Statement Function-Variables-free and bound variables-Quantifiers-Universe of discourse-Logical equivalences and implications for quantified statements-Theory of inference-The rules of universal specification and generalization-Validity of arguments.

**UNIT III SET THEORY AND FUNCTIONS (9+3)**

Set Operations-Properties-Power set-Relations-Graph and matrix of a relation-Partial Ordering-Equivalence relation-Partitions-Functions-Types of functions-Composition of relation and functions-inverse functions.

**UNIT IV COMBINATORICS (9+3)**

Basics of counting-Counting arguments-Pigeonhole Principle-Permutations and Combinations- Recursion and recurrence relations- Generating Functions-Mathematical Induction-Inclusion-Exclusion.

**UNIT V GRAPH THEORY (9+3)**

Introduction to graphs-Graph operations-Graph and Matrices-Graph Isomorphism-Connected graphs-Euler Graphs-Hamilton paths and circuits.

**TOTAL (L:45,T:15) = 60 PERIODS**

**TEXT BOOKS:**

1. Tremblay J.P and Manohar R,"Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-HILL, New Delhi, Reprint 2010.
2. Veeraranjan.T, "Discrete Mathematics with Graph Theory and Combinatorics", 4<sup>th</sup> ed., Tata McGraw Hill, New Delhi, 2008.

**REFERENCES:**

1. Kenneth H.Rosen, Discrete Mathematics and its Applications ,5<sup>th</sup> ed., Tata McGraw- Hill publications, New Delhi 2007.
2. Venkatraman M.K., "Discrete Mathematics", The National Publishing Company, Chennai,2007.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x					x	x	x
2	x	x	x	x	x					x	x	x
3	x	x	x	x	x	x				x	x	x
4	x	x	x	x	x					x	x	x
5	x	x	x	x	x					x	x	



## 15GEC02 ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To manage an Organization; to describe principles of macroeconomics to have the understanding of economic environment of Business.
- To acquire a reasonable knowledge in Accounts.
- To analyse and evaluate Financial Statements.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Know the importance of Engineering Economics and Principles of Micro and Macro Economics.
- CO2 Estimate the Market Position with the Knowledge in Demand Forecasting and Supply.
- CO3 Develop and Estimate Cost for any Project.
- CO4 Fix the Price of the Product with the Knowledge in different Market Structure.
- CO5 Analyze the Financial Statement to determine the optimal Managerial Decisions.

### UNIT I INTRODUCTION

(5)

Managerial Economics – Relationship with other disciplines, Firms – Types, Objectives and Goals, Managerial Decisions, Decision Analysis.

### UNIT II DEMAND AND SUPPLY ANALYSIS

(10)

Demand – Types of Demand, Determinants of Demand, Demand Function, Demand Elasticity, Demand Forecasting. Supply – Determinants of Supply, Supply Function, Supply Elasticity.

### UNIT III PRODUCTION AND COST ANALYSIS

(10)

Production Function – Returns to scale, Production Optimization, Isoquants, and Managerial uses of Production Function. Cost Concepts – Cost Function, Determinants of Cost, Estimation of Cost.

### UNIT IV PRICING

(10)

Determinants of Price, Pricing under different Objectives and different Market Structures, Price Discrimination, Pricing methods in practice.

### UNIT V FINANCIAL ACCOUNTING AND CAPITAL BUDGETING

(10)

Introduction to Financial, Cost and Management Accounting, Accounting Concepts and Conventions, Final Accounts, Investments – Evaluation of Investment Decision – Average Rate of Return, Payback Period, Net Present Value.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Anjali Bagad, "Engineering Economics and Financial Accounting", Technical Publications 2<sup>nd</sup> Revised ed., 2011.
2. B. Senthil Arasu, J. Praveen Paul, "Engineering Economics and Financial Accounting", SchiTech Publication (India) Pvt. Ltd.

### REFERENCES:

1. McGuigan, Moyer and Harris, "Managerial Economics; Applications, Strategy and Tactics", Thomson South Western, 10<sup>th</sup> ed., 2005.
2. Paresh Shah, "Basic Financial Accounting for Management", Oxford University Press, New Delhi, 2007.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x							x				
2	x	x	x	x					x	x		x
3		x		x					x	x	x	x
4	x	x		x			x			x		x
5		x		x						x	x	



## 15CS501 WEB TECHNOLOGY

L	T	P	C
3	0	2	4

### OBJECTIVE:

- To understand the basic concepts of web programming and internet
- To learn how to use javascript in web applications
- To Have an basic knowledge of Java servlets and Java server pages
- To learn the basics of XML and AJAX technologies
- To describe the working of web services.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Implement the basic concepts of web programming
- CO2 Develop interactive web applications using Javascript
- CO3 Differentiate how servlets and Java Server Pages (JSP) fit into java-based web application architecture
- CO4 Present data in XML format and design rich client presentation using AJAX.
- CO5 Design and launch web services.

### UNIT I INTRODUCTION TO INTERNET, HTML AND CSS (10)

Web Essentials: Basic Internet Protocol - WWW - HTTP Request Message - HTTP Response Message - HTML Introduction - Basic XHTML syntax and Semantics - HTML Elements & Attributes - Lists - Tables - Frames - Forms- Defining XHTML's Abstract Syntax - CSS - Features - Syntax - Cascading and Inheritance - Text Properties - Box Model

### UNIT II JAVASCRIPT (9)

Introduction - Basic Syntax - Variable - Data Types - Operators and Literals - Functions - Objects - Arrays - Event Handling - Validation - Introduction to Node.js

### UNIT III SERVLETS AND JSP (10)

Java Servlets: Architecture - Servlet Generating Dynamic Content-Life Cycle - Parameter Data-Sessions - Cookies; JSP : Overview - Running JSP Application - Basic JSP - JavaBeans Classes and JSP - Libraries and Files - MVC Paradigm

### UNIT IV XML and AJAX (8)

XML: XML Namespaces - XML Processing - Transforming XML Documents - XSLT; AJAX: Ajax Client Server Architecture-XML Http Request Object - Call Back Methods

### UNIT V INTRODUCTION TO WEB SERVICES (8)

JAX-RPC Concepts-Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: WSDL- Representing Data Types: XML Schema-Communicating Object Data: SOAP- Related Technologies

### HTML: (4)

1. Write a HTML program for Creation of web site with

- Forms and Controls
- Frames
- Links
- Tables

- CSS :** (4)  
 2. Design a web site with horizontal menu-bar using HTML and CSS. Use Basic text Formatting and test CSS flow models.
- Java Script:** (6)  
 3. Create Client Side Scripts & Server Side Scripts for Validating Web Form Controls
- Servlet:** (4)  
 4. Develop an Online Application using java servlet and database connectivity.
- JSP:** (4)  
 5. Develop an Online Application using java server pages and database connectivity.
- AJAX:** (4)  
 6. Create a simple web application using AJAX.
- Web Service:** (4)  
 7. Develop a simple web service and consume it using an application.

**TOTAL (L:45, P:30) = 75 PERIODS**

**TEXT BOOKS:**

1. Jeffrey C.Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2011.
2. Deitel Deitel Nieto, "Internet & World Wide Web How to Program", 5<sup>th</sup> ed., 2012.

**REFERENCES:**

1. Thomas A. Powell, "The Complete Reference HTML & CSS", 5<sup>th</sup> ed., 2010.
2. Steve Suehring, "JavaScript – Step by Step", PHI, 3<sup>rd</sup> ed., 2013.
3. Brad Dayley, "Node.js, MongoDB and AngularJS Web Development", Pearson Education, 2014

**Mapping of Course Outcomes (COs) and Programe Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x		x								
2	x	x	x	x	x	x			x		x	x
3	x				x						x	x
4	x	x	x	x	x	x					x	x
5	x	x	x	x	x	x			x		x	x

*SA*

## 15CS502 OBJECT ORIENTED ANALYSIS AND DESIGN

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To learn the basics of object and object oriented methodologies.
- To know about object oriented analysis.
- To familiarize in unified modeling language.
- To understand the design patterns.
- To acquire knowledge on software quality and testing.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Interpret the object basics and object oriented life cycle.
- CO2 Identify classes and their relationships.
- CO3 Develop UML diagrams for various projects.
- CO4 Apply object oriented design patterns.
- CO5 Realize the need of software quality and testing.

### UNIT I INTRODUCTION AND METHODOLOGIES (9)

An Overview of Object Oriented Systems Development -Object Basics –Object Oriented Systems Development Life Cycle - Unified Approach - Rumbaugh Methodology –Booch Methodology - Jacobson Methodology.

### UNIT II OBJECT ORIENTED ANALYSIS (9)

Identifying use cases - Object Analysis -Classification – Identifying Object - Relationships - Attributes and Methods.

### UNIT III UNIFIED MODELING LANGUAGE (9)

Introduction – UML Diagrams - Use case Diagram - Class diagram - Interaction Diagram - State chart Diagram - Activity Diagram – UML Meta Model.

### UNIT IV DESIGN PATTERNS (9)

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – Controller – High Cohesion – Designing for visibility - Applying GoF design patterns – adapter, singleton, factory and observer patterns.

### UNIT V SOFTWARE QUALITY AND TESTING (9)

Software Quality Assurance – Testing Strategies – Test cases – Test plan – System Usability and Measuring User Satisfaction – Usability testing – User satisfaction test – CASE STUDY.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Ali Bahrami, "Object Oriented Systems Development", Tata McGraw-Hill, 2008.
2. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", 3<sup>rd</sup> ed., Pearson Education, 2012.

### REFERENCES:

1. Stephen R. Schach, "Introduction to Object Oriented Analysis and Design", Tata McGraw- Hill, 2004.
2. Grady Booch, "Object Oriented Analysis & Design with applications", Pearson Education Asia, 3<sup>rd</sup> ed., 2009

## Mapping of Course Outcome and Programme Outcome

Mapping of COs and Pos												
COs	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x				x			x
2	x	x	x	x					x	x		x
3	x	x	x		x				x	x		x
4	x	x	x		x				x	x	x	x
5	x			x	x			x	x	x	x	x



## 15CS503 GRAPHICS AND MULTIMEDIA

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To introduce the graphics model with the help of basic algorithms and methodologies.
- To equip students with fundamental knowledge and basic technical competence in the field of computer graphics.
- To provide an understanding of color models and surface detection methods.
- To enable students to acquire knowledge in Multimedia concepts.
- To learn the Audio, Video and Animation techniques.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Know the Fundamentals of Graphics
- CO2 Design two dimensional and three dimensional graphics and transformations.
- CO3 Apply colour models to graphics.
- CO4 Create basic multimedia presentations.
- CO5 Design animation sequences.

### UNIT I FUNDAMENTALS (9)

Introduction to Computer Graphics – Raster and vector graphics systems – Output primitives – Points and lines – Line drawing algorithms – Loading the frame buffer – Line function – Circle and ellipse generating algorithms – Pixel addressing and object geometry – Filled area primitives – Anti-aliasing

### UNIT II 2D-3D REPRESENTATION AND MANIPULATION (9)

2D Transformation: Translation, rotation, scaling, reflection and shearing – Matrix and homogeneous coordinates – Composite 2D transformations – 2D Viewing – Clipping: line, polygon and text clipping. 3D Transformation: Translation, rotation, scaling, reflection, shearing – Composite 3D transformation – 3D Viewing – Projection – 3D clipping.

### UNIT III VISIBLE SURFACE DETECTION AND COLOR MODELS (9)

Back face detection – Depth buffer method – A-Buffer method – Scan line method – Depth sorting method – BSP – Tree method – Area Subdivision method – Octree method – Ray casting – Curved surfaces – Wireframe methods – Visibility Detection Functions – Color Models – RGB, CMY, HSV, HLS, CIE models.

### UNIT IV INTRODUCTION TO MULTIMEDIA (9)

Branch-overlapping Aspects of Multimedia – Content – Global Structure – Multimedia: Media and Data Streams – Medium – Main Properties of a Multimedia System – Multimedia – Traditional Data Stream Characteristics – Data Streams Characteristics for Continuous Media – Information Units.

### UNIT V AUDIO, VIDEO AND ANIMATION (9)

Audio: Basic Sound Concepts – Music – Speech – Animation: Computer based Animation – Data Compression : Storage Space – Coding Requirements – Source , Entropy and Hybrid Coding – Some Basic Compression Techniques – JPEG, H.261, MPEG, DVI – Case Study : Video Mixing.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Donald Hearn and Pauline Baker, Computer Graphics, Prentice Hall, New Delhi, 2<sup>nd</sup> ed., 2012.
2. Ralf Steinmetz and Klara Mahrstedt, "Multimedia computing, communications and a Applications", Pearson Education Asia, 6<sup>th</sup> impression 2012.

**REFERENCES:**

1. Ranjan Parekh, "Principles of Multimedia", Tata McGraw-Hill, 2013.
2. John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley , " Graphics: Computer Principles and Practice", , 3<sup>rd</sup> ed., Addison- Wesley Professional, 2013.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x								x
2	x	x	x	x								x
3	x	x	x	x	x							x
4	x	x	x	x	x	x	x	x	x			x
5	x	x	x	x	x	x	x	x	x			x



## 15CS511 CASE TOOLS LABORATORY

L	T	P	C
0	0	4	2

### OBJECTIVE:

- To have a knowledge on problem analyzing.
- To learn how to identify objects and their relationships.
- To get familiarized on object oriented design process.
- To know the project module development using tools.
- To gain experience on writing test cases.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Outline the Project Scope And Objectives.
- CO2 Write the Software Requirement Analysis.
- CO3 Create Data Modelling.
- CO4 Develop and Debug the Projects.
- CO5 Generate Test Cases using Testing Strategies.

**Prepare the following documents for the project and develop the software using software engineering methodology.**

1. Problem Analysis and Project Planning - study of the problem, Identify project scope, Objectives, and infrastructure
2. Software Requirement Analysis - Phases/ modules of the project, Identify deliverables.
3. Data Modeling - use work products, data dictionary and UML diagrams.
4. Software Development and Debugging.
5. Software Testing - Prepare test plan, perform validation testing, coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor.

### SAMPLE PROJECTS:

1. EB Bill Management Systems
2. ATM system
3. Attendance management system
4. Courier information systems
5. Student marks analyzing system
6. Passport automation system
7. Online course registration system
8. Examination result system
9. Library management system
10. Payroll system

### Software Required:

Case Tools : Rational Suite, Win runner, Empirix, Pencil Tool  
Languages : C/C++/JDK 1.3, JSDK, INTERNET EXPLORER, UML  
Front End : VB, VC++, Developer 2000  
Back End : Oracle, MS-Access, SQL

**TOTAL (P:60) = 60 PERIODS**

## Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x						x		x	x
2	x	x			x				x		x	x
3	x	x	x		x						x	x
4	x	x	x	x	x		x		x		x	x
5	x	x			x		x		x		x	x



## 15CS512 GRAPHICS AND MULTIMEDIA LABORATORY

L	T	P	C
0	0	4	2

### OBJECTIVE:

- To learn algorithmic development of graphics primitives like: line, circle, ellipse, polygon etc.
- To understand the need of developing graphics applications.
- To learn the representation and transformation of graphical images and pictures.
- To illustrate the impact of animations.
- To know the impact of videos.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Draw basic shapes such as lines, circle and ellipse.
- CO2 Perform processing of basic shapes by various processing algorithms /techniques.
- CO3 Apply the transformations to the basic shapes and various clipping algorithms.
- CO4 Design animation sequences using Open source animation Software.
- CO5 Create videos using video editing Software.

### LIST OF EXPERIMENTS

1. Implementation of Line Drawing Algorithms
  - a) DDA
  - b) Bresenham
2. Implementation of Bresenham's Circle and Ellipse Generation Algorithm
3. Implementation of Two Dimensional Transformations
4. Implementation of Cohen-Sutherland Line Clipping Algorithm
5. Implementation of 3D Transformations
6. Basic Operations on the Image using image manipulation software.
  - Selection Tool
  - Color Tool
  - Brush Tool
  - Clone Tool
  - Blur
  - Scale Tool
7. Animation using 2D Animation Software.
  - Tweening
8. Video Editing.

### Software required:

1. Turbo C Software
2. Gimp,Paint .Net,etc.
3. Tupi 2d Animation, Synfig,etc.
4. Video editor – Movie maker, Virtual dub,etc.

**TOTAL (P:60) = 60 PERIODS**

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x							x
2	x	x	x	x	x							x
3	x	x	x	x	x	x						x
4	x	x	x	x	x	x	x	x				x
5	x	x	x	x	x	x	x	x				x



## 15GY511 – SOFT SKILLS APTITUDE AND REASONING – I

L T P C  
0 0 2 0

### OBJECTIVE:

- To enhance the students to write and speak fluently with the help of grammatical structures
- To develop students to workout solution for problems that involves mathematical aptitude
- To develop students to workout solutions for problems that involves general reasoning

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Write and speak fluently without any grammatical errors
- CO2 Solve aptitude problems with ease
- CO3 Solve reasoning problems with ease

### UNIT I SOFT SKILLS

(10)

Grammar –Parts of Speech, Tenses, Subject - Verb agreement , Articles, Preposition, Conjunctions, Modal Auxiliaries, Degrees of Comparison – Self Introduction - Role Play - Object Description – Passage writing

### UNIT II APTITUDE

(10)

Average - Percentage - Age Ratio & Proportion - Partnership - Profit & loss - Mixture & Allegation

### UNIT III REASONING

(10)

Odd man out - Number Series - Syllogism - Coding & decoding - Seating arrangement.

**TOTAL (L:30) = 30 PERIODS**

### TEXT BOOKS:

1. Thorpe, Edgar and Shawick Thorpe, "Objective English", 3<sup>rd</sup> ed., New Delhi: Pearson, 2011 Print.
2. Khattar, Dinesh, "Quantitative Aptitude", 3<sup>rd</sup> ed. New Delhi: Pearson, 2014 Print.

### REFERENCES:

1. Prasad, Hari Mohan & Uma Rani Sinha, "Objective English for Competitive Examinations", 4<sup>th</sup> ed., New Delhi: Tata McGraw Hill Education Pvt.Ltd., 2010 Print.
2. Aggarwal R.S., "A Modern Approach to Verbal & Non Verbal Reasoning", Revised Edition, New Delhi: S.Chand Publishers, 2017 Print.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1							x	x	x	x		x
2												x
3							x	x				x

*St*

## 15CS601 SECURITY IN COMPUTING

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand the basics of cryptography
- To learn to find the vulnerabilities in programs and to overcome them
- To know the different kinds of security threats in networks, databases and the different solutions available
- To learn about the models and standards for security

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Understand the various cryptographic techniques.
- CO2 Identify the different types of software errors.
- CO3 Employ security mechanism for networks.
- CO4 Secure databases using the security mechanisms.
- CO5 Realize the needs of security standards and models.

### UNIT I ELEMENTARY CRYPTOGRAPHY

(9)

Terminology and Background – Substitution Ciphers – Transpositions – Making Good Encryption Algorithms- Data Encryption Standard- AES Encryption Algorithm – Public Key Encryption – Cryptographic Hash Functions – Key Exchange – Digital Signatures – Certificates

### UNIT II PROGRAM SECURITY

(9)

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls Against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Top 10 Flaws – Common Weakness Enumeration Top 25 Most Dangerous Software Errors

### UNIT III SECURITY IN NETWORKS

(9)

Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL – IPsec – Content Integrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure e-mail.

### UNIT IV SECURITY IN DATABASES

(9)

Security requirements of database systems – Reliability and Integrity in databases – Two Phase Update – Redundancy/Internal Consistency – Recovery – Concurrency/Consistency – Monitors – Sensitive Data – Types of disclosures – Inference.

### UNIT V SECURITY MODELS AND STANDARDS

(9)

Secure SDLC – Secure Application Testing – Security architecture models – Trusted Computing Base – Bell-LaPadula Confidentiality Model – Biba Integrity Model – Graham-Denning Access Control Model – Harrison-Ruzzo-Ulman Model – Secure Frameworks – COSO – CobiT – Compliances – PCI DSS – Security Standards - ISO 27000 family of standards – NIST.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", 5<sup>th</sup> ed., Prentice Hall, 2015.
2. Matt Bishop, "Introduction to Computer Security", Addison-Wesley, 2004.
3. Michael Whitman, Herbert J. Mattord, "Management of Information Security", 3<sup>rd</sup> ed., Course Technology, 2010.

**REFERENCES:**

1. William Stallings, "Cryptography and Network Security: Principles and Practices", 5<sup>th</sup> ed., Prentice Hall, 2010.
2. Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", 1<sup>st</sup> ed., Mc Graw Hill Osborne Media, 2009.
3. Matt Bishop, "Computer Security: Art and Science", 1<sup>st</sup> ed., Addison-Wesley, 2002.
4. [https://www.owasp.org/index.php/Top\\_10\\_2010](https://www.owasp.org/index.php/Top_10_2010).

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x						x				
2	x	x		x	x			x				
3	x	x		x				x				
4	x	x			x			x				
5	x	x			x			x				x



## 15CS602 C# AND .NET FRAMEWORK

L	T	P	C
3	0	2	4

### OBJECTIVE:

- To impart the fundamental concepts of C# and .NET.
- To know the object oriented aspects of C#.
- To learn about the database connectivity for applications with ADO.NET.
- To learn about the web based application development.
- To know the CLR and .NET framework features.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Implement the basic features of C#.
- CO2 Understand the object oriented aspects of c#.
- CO3 Develop simple windows applications using .NET.
- CO4 Create simple web applications using .NET.
- CO5 Realize the features of .NET framework.

### UNIT I BASICS OF C# and .NET (9)

Introducing C# – Understanding .NET – Overview of C# – Literals – Variables – Data Types – Operators – Expressions – Control statements – Methods – Arrays – Strings – Structures – Enumerations.

### UNIT II OBJECT ORIENTED ASPECTS OF C# (9)

Classes – Objects – Inheritance – Properties – Indexers – Polymorphism – Interfaces – Operator Overloading – Delegates – Events – Collections – Errors and Exceptions.

### UNIT III APPLICATION DEVELOPMENT ON .NET (9)

Building Windows Applications – Windows Form Controls – Common Dialog Box – Creating User Controls – Components – ADO.NET Architecture – Accessing Data with ADO.Net – Crystal Report.

### UNIT IV WEB BASED APPLICATION DEVELOPMENT ON .NET (9)

Programming Web Applications With Web Forms – Web Controls and Properties – Cascading Style Sheet – Web User Controls – Data Bound Controls – Programming Web Services.

### UNIT V CLR AND THE .NET FRAMEWORK (9)

Assemblies – Versioning – Attributes – Reflection – Viewing Meta Data – Type Discovery – Reflection on Type – Marshalling – Remoting – Garbage Collection.

### BASICS OF C#: (6)

1. Write a C# program using Arrays and Strings.
2. Write a C# program using Structures and Enumerations

### OBJECT ORIENTED ASPECTS OF C# (6)

3. Write a C# program using Inheritance.
4. Write a C# program for operator overloading.
5. Write a C# program using Delegates and Events.

### ERRORS AND EXCEPTIONS: (2)

6. Write a program to demonstrate exception handling in C#.

### MULTI MODULE ASSEMBLY: (4)

7. Write a C# program to understand Multi module Assembly.

### WINDOWS APPLICATION & ADO.NET: (4)

8. Develop a simple Windows Application using ADO.NET for database connectivity.

### WEB APPLICATION: (4)

9. Develop an ASP.NET application using web controls

**WEB SERVICE:****(4)**

10. Create a simple Web Service using ASP.NET and consume it using an application.

**TOTAL (L:45,P:30) = 75 PERIODS****TEXT BOOKS:**

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata Mc Graw Hill, 2015.
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

**REFERENCES:**

1. Andrew Troelsen, "Pro C# 2010 and the .NET 4 Platform, 5<sup>th</sup> ed., A Press, 2010.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", 6<sup>th</sup> ed., O'Reilly, 2010.
3. E. Balagurusamy, "Programming in C# - A Primer", 3<sup>rd</sup> ed., Tata McGraw-Hill, 2010.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x						x	x
2				x	x						x	x
3	x	x	x	x	x						x	x
4	x	x	x		x						x	x
5	x	x	x	x	x						x	x



## 15CS603 OPEN SOURCE TOOLS AND DEVELOPMENT

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand the need of open source software
- To gain knowledge about LINUX, MySQL, PHP, PYTHON and PERL
- To create Software applications that can be accessed by all the people over the internet and to allow the users to customize the software based on their requirements.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Know the basic concepts of open source and LINUX
- CO2 Configure web server and MySQL
- CO3 Develop a webpage using PHP
- CO4 Design an application using python
- CO5 Build an application with PERL

### UNIT I OPEN SOURCE OPERATING SYSTEM

(9)

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources– Application of Open Sources – Open Source Licenses. Open Source Operating Systems: LINUX - Kernel Mode and User Mode- Installation – Processes – User Management – File Systems – Development with Linux

### UNIT II WEB SERVER AND TOOLS

(9)

Web Server: Apache Web server – Working with Web Server – Configuring and Using apache web services - MySQL: Introduction – Installing and configuring MySQL – Data Types – Working with Databases and Tables – Open Source Software tools and processors – Eclipse IDE platform – Compilers – Model Driven Architecture tools.

### UNIT III PHP

(9)

PHP: Introduction- Programming in Web Environment- Variables- Constants- Data types- Operators- Statements- Functions- Arrays- OOP- String manipulation and regular expression- File handling and data storage- PHP and SQL database- PHP and LDAP- PHP connectivity- Sending and Receiving E-mails- debugging and Error Handling- Security.

### UNIT IV PYTHON

(9)

Overview of PYTHON - Syntax and Style- Python objects-Numbers-Sequences-Strings-Lists and Tuples - Dictionaries- Conditionals and loops – Files – Input and Output – Error and Exceptions – Functions – Modules – Classes and OOP – Execution Environment

### UNIT V PERL

(9)

Perl Backgrounder – Perl Overview – Perl Parsing Rules – Variables and Data – Statements and Control Structures – Subroutines - Packages and Modules - Working with Files – Data Manipulation.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Hitesh Singh, NidhiArora, "Linux and X-WINDOWS PROGRAMMING", 1<sup>st</sup> ed., S.K. Kataria & Sons, New Delhi, 2011.
2. W. Jason Gilmore, "Beginning PHP and MySQL: From Novice to Professional", 3<sup>rd</sup> ed., Apress, USA, 2010.
3. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2001
4. Martin C. Brown, "Perl: The Complete Reference", 2<sup>nd</sup> ed., Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

### REFERENCES:

1. Richard Petersen "The Complete Reference Linux ", 6<sup>th</sup> ed., Tata McGraw Hill Edition 2010.
2. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003
3. VikramVaswani, "MYSQL: The Complete Reference", 2<sup>nd</sup> ed., Tata McGraw- Hill Publishing Company Limited, Indian Reprint 2009.
4. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
5. Steven Holzner, "PHP: The Complete Reference", 2<sup>nd</sup> ed., Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
6. Peter Wainwright, "Professional Apache", Wrox Press, USA, 2002.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x								x
2	x	x	x	x								x
3	x	x	x	x	x							x
4	x	x	x	x	x	x	x	x				x
5	x	x	x	x	x	x	x	x				x

## 15CS604 PRINCIPLES OF COMPILER DESIGN

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To Learn the design principles of a Compiler
- To understand the DFA and NFA concepts.
- To understand, design and implement the different parsing techniques.
- To learn and design intermediate code generation schemes and run time environment.
- To learn how to optimize and effectively generate machine codes.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Describe the phases of compiler and lexical scanning.
- CO2 Design problems in DFA and NFA.
- CO3 Generate different parsing table from grammars.
- CO4 Develop intermediate code for the given source code.
- CO5 Apply the various optimization techniques to design compiler.

### UNIT I INTRODUCTION

(9)

Translators - Compilation and Interpretation - Language processors - Introduction to compiling – Analysis of the source program – The phases of a compiler – Cousins of a compiler – The grouping of phases – Compiler construction tools.

### UNIT II LEXICAL ANALYSIS

(9)

The role of the lexical analyzer – Input buffering – Specification and Recognition of tokens – Finite Automata - Nondeterministic Finite Automata - Acceptance of Input Strings by Automata - Deterministic Finite Automata - Converting Regular Expression to DFA - Converting NFA to DFA - Minimization of DFA.

### UNIT III SYNTAX ANALYSIS

(9)

Syntax Analysis – The role of a parser – Context free grammar – Top down parsing– Recursive descent parsing, Predictive parsing – Bottom up parsing – LR parsers – Construction of a simple SLR, CLR and LALR parsing table.

### UNIT IV INTERMEDIATE CODE GENERATION AND RUN TIME ENVIRONMENT

(9)

Intermediate languages – Declarations – Assignment statements – Boolean expressions – Case statements – Back patching – Procedure calls. Run - Time Environments – Source language issues – Storage-allocation strategies.

### UNIT V CODE GENERATION AND CODE OPTIMIZATION

(9)

Issues in the design of a code generator – The Target machine – Run time storage management – Register allocation and assignment – The DAG representation of basic blocks – The Principle sources of Optimization – Peephole Optimization – Optimization of basic blocks.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Alfred V. Aho, Ravi Sethi Jeffrey D. Ullman, "Compilers – Principles, Techniques, and Tools", Pearson Education Asia, 2013.

### REFERENCES:

1. Steven S. Muchnick, "Advanced Compiler Design & Implementation", Morgan Kaufmann Publishers, 2003.
2. C. N. Fisher and R. J. LeBlanc "Crafting a Compiler with C", Pearson Education, 2011.
3. Sudha Sadasivam G, "Compiler Design", Scitech Publications (India) Private Limited, Chennai, 2010
4. Dhamdhare D M, "Compiler Construction Principles & Practice", Macmillan India Limited, New Delhi, 1997.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x								x
2	x	x	x	x								x
3	x	x	x	x								x
4	x	x	x	x								x
5	x	x	x	x								x



**15CS612 OPEN SOURCE LABORATORY**

L	T	P	C
0	0	4	2

**OBJECTIVE:**

- To gain knowledge on LINUX configuration and installation
- To gain knowledge on open source database
- To understand and apply open source programming language
- To develop web applications
- To understand how to configure web server

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Install Linux in all modes.  
 CO2 Develop a web page using PHP.  
 CO3 Install and configure the web server  
 CO4 Create an application using Python.  
 CO5 Build an application with PERL

**LIST OF EXPERIMENTS**

1. Installation of LINUX OS in different modes
2. Basic Linux commands.
3. PHP Script (Statements, Array, Functions and File handling)
4. PHYTON programming
5. PERL
6. Web Server installation and Configuration
7. Web Development (for any application)

**TOTAL (P:60) = 60 PERIODS**

**Software required:**

1. Linux Software (Fedro, Redhat, Ubuntu)
2. Virtual Machine
3. Phyton Software
4. Web Server (XAMP, Wamp Server)

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x						x	x		x		
2	x	x	x				x	x			x	
3	x	x	x				x				x	x
4	x	x	x			x	x	x	x	x	x	x
5	x	x	x				x	x		x	x	x

**15GE611 COMPREHENSION**

L	T	P	C
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Approved by Sixth Academic Council

**OBJECTIVE:**

- To encourage the students to comprehend the knowledge acquired from the first Semester to Sixth Semester of B.E Degree Course through periodic exercise.

**COURSE OUTCOMES:**

At the end of the course, student will be able to

CO1 Understand and comprehend any given problem related to computer science & engineering field.

**METHOD OF EVALUATION:**

The student will be assessed for his understanding of the basic principles of the core engineering subjects. The internal assessment for a total of 50 marks will be evaluated by a committee comprising of the faculty members of the department. The committee will conduct three written examinations of objective question type from the subjects as follows

- Test 1 - C Programming, Data Structures, Operating systems, Computer Networks.
- Test 2 - Java Programming, Database Systems, Computer Architecture, Software Engineering.
- Test 3 - Mobile Computing, Web technology, Object Oriented Analysis and Design.

The end semester examination, which carries a total of 50 marks, will be an objective question type examination conducted by a committee of one internal examiner appointed by the COE of our college.

**TOTAL (P:30) = 30 PERIODS**

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x		x						x	x

## 15GY611 SOFT SKILLS APTITUDE AND REASONING - II

L T P C  
0 0 2 0

### OBJECTIVE:

- To enhance the students to write and speak fluently with the help of grammatical structures
- To develop students to workout solution for problems that involves mathematical aptitude
- To develop students to workout solutions for problems that involves general reasoning

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Write and speak fluently without any grammatical errors  
CO2 Solve aptitude problems with ease  
CO3 Solve reasoning problems with ease

### UNIT I SOFT SKILLS

(10)

Grammar – Synonyms and Antonyms, Error Spotting, Statement Completion, Idioms & Phrases, One word Substitution, Confusable Words, Jumbled Words / Sentences, Reading Comprehension, Theme Detection, Punctuation – Job Application with Resume – Written Communication - Impromptu Speech – Group Discussion – Mock Interview.

### UNIT II APTITUDE

(10)

Simple Interest - Probability - Speed & Distance – Time & Work - Calendar - Clock

### UNIT III REASONING

(10)

Analogy - Blood Relations - Directions - Data Interpretation - Data sufficiency

**TOTAL (L:30) = 30 PERIODS**

### TEXT BOOKS:

2. Thorpe, Edgar and Shawick Thorpe, "Objective English", 3<sup>rd</sup> ed., New Delhi: Pearson, 2011 Print.
3. Khattar, Dinesh, "Quantitative Aptitude", 3<sup>rd</sup> ed. New Delhi: Pearson, 2014 Print.

### REFERENCES:

3. Prasad, Hari Mohan & Uma Rani Sinha, "Objective English for Competitive Examinations", 4<sup>th</sup> ed., New Delhi: Tata McGraw Hill Education Pvt.Ltd., 2010 Print.
4. Aggarwal R.S., "A Modern Approach to Verbal & Non Verbal Reasoning", Revised Edition, New Delhi: S.Chand Publishers, 2017 Print.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1							x	x	x	x		x
2												x
3							x	x				x



## 15CS701 PRINCIPLES OF CLOUD COMPUTING

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

- To understand the basic concepts of the cloud.
- To understand the architecture and virtualization of cloud.
- To describe the key elements of Cloud Platform and Thread Programming.
- To understand the concepts of Map Reduce Programming.
- To design intelligent Cloud services and Applications.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 : Recall and describe Cloud Platform and Technology.
- CO2 : Describe and Implement Virtualization Technologies.
- CO3 : Develop and manage Cloud Applications using Aneka.
- CO4 : Create a Hadoop Environment and Generate a Map- Reduce Programming.
- CO5 : Design a Web Based Applications of various Corporate.

### UNIT I INTRODUCTION (9)

Introduction: Cloud computing at a Glance – Historical Development – Building Cloud Computing Environments – Computing Platform and Technologies – Principles of Parallel and Distributed Computing: Elements of parallel Computing – Distributed Computing –Technologies of Distributed Computing.

### UNIT II VIRTUALIZATION AND CLOUD COMPUTING ARCHITECTURE (9)

Virtualization: Introduction – Characteristics of Virtualized Environments – Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization – Technology Examples – Cloud Computing Architecture: Cloud reference model – Types of the Clouds – Open Challenges.

### UNIT III PROGRAMMING ENTERPRISE CLOUDS USING ANEKA (9)

Aneka: Cloud Application Platform – Anatomy of the Aneka Container – Building Aneka Clouds – Cloud Programming and Management – Concurrent Computing: Thread Programming – Programming Applications with Threads – Multi Threading and Programming applications with Aneka Threads.

### UNIT IV HIGH THROUGHPUT COMPUTING AND MAP REDUCE PROGRAMMING (9)

High Throughput Computing: Task Programming – Task Computing – Task Based Application Models – Aneka Task-Based Programming – Data Intensive Computing: Map-Reduce Programming – Data Intensive Computing – Technologies for Data-Intensive Computing – Aneka Map-Reduce Programming.

### UNIT V CLOUD PLATFORMS AND APPLICATIONS (9)

Cloud Platforms in Industry: Amazon Web Services – Google AppEngine – Microsoft Azure – Cloud Application: Scientific Applications – Business and consumer Applications – Case Study – Cloud Deployment Tools: Eucalyptus, open Nebula.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Rajkumar Buyya, Christian Vecchiola and Thamari Selvi S, "Mastering in Cloud Computing", McGraw Hill Education (India) Private Limited, 2013.

**REFERENCES:**

1. Anthony T Velte, "Cloud Computing: A practical Approach", Tata McGraw Hill, 2009.
2. Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, "Cloud Computing for Dummies", Wiley India, 2009.
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing Principles Books and Paradigms", Wiley, 2014.
4. Michael Miller , "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing ,2009
5. Dr. Kumar Saurabh, "Cloud Computing – Unleashing Next Gen Infrastructure to Application", Willey, 2014.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x				x			x			x	x
2	x	x		x	x	x					x	x
3	x	x	x	x	x		x		x		x	x
4	x	x	x	x	x	x	x		x		x	x
5	x	x	x	x	x	x	x	x	x		x	x



## 15CS711 SECURITY LABORATORY

L	T	P	C
0	0	4	2

### COURSE OBJECTIVE:

- Be exposed to the different cipher techniques
- Learn to implement the algorithms DES, RSA.
- Understand the basics of MD5,SHA-1
- Learn to use network security tools like GnuPG, KF sensor, Net Strumbler.
- Provides in-depth practical base on IDS using SNORT.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Implement the cipher techniques.
- CO2 Develop the various security algorithms.
- CO3 Apply various key generation techniques.
- CO4 Use different open source tools for network security and analysis.
- CO5 Identify threats in network using some tools.

### LIST OF EXPERIMENTS:

1. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:  
a) Caesar Cipher b) Playfair Cipher c) Hill Cipher d) Vigenere Cipher e) Rail fence – row & Column Transformation.
2. Implement the following algorithms  
a) DES b) RSA Algorithm c) Diffie-Hellman d) MD5 e) SHA-1
3. Implement the SIGNATURE SCHEME - Digital Signature Standard.
4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
5. Setup a honey pot and monitor the honeypot on network (KF Sensor)
6. Installation of root kits and study about the variety of options
7. Perform wireless audit on an access point or a router and decrypt WEP and WPA.( Net Stumbler)
8. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

### Software Required:

C / C++ / Java or equivalent compiler GnuPG, KF Sensor or Equivalent, Snort, Net Stumbler or Equivalent

**TOTAL (P:60) = 60 PERIODS**

## Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x						x		x	x
2	x	x			x				x		x	x
3	x	x	x		x						x	x
4	x	x	x	x	x		x		x		x	x
5	x	x			x		x		x		x	x



## 15CS731 PROJECT WORK I

L	T	P	C
0	0	8	4

### COURSE OBJECTIVE:

- To identify the problem in the specific domain or enhance the existing product to the next level.
- To learn how to formulate solution for the problem.
- To be trained to function effectively as an individual and a member in diverse teams.
- To interpret and justify the experimental results
- To develop an effective communication and be trained to write dissertation report

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Demonstrate a sound technical knowledge of their selected project topic.
- CO2 Undertake problem formulation and solution legally for the sustainable development.
- CO3 Develop an attitude of team work and independent working on real time problems.
- CO4 Design engineering solutions to complex problems based on engineering and management principles.
- CO5 Communicate with engineers and the community at large in written and oral forms.

### THE PROJECT INVOLVES THE FOLLOWING

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. 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. Either second or third review is evaluated by an industry expert. Finally, prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners.

### PROJECT WORK WILL BE EVALUATED BY CONTINUOUS ASSESSMENT AND END SEMESTER ASSESSMENT

Continuous Assessment - 50 Marks				End Semester Assessment - 50 Marks	
	Guide	Committee	Total	Internal Examiner	40
0 <sup>th</sup> Review	10	10	20	External Examiner	40
1 <sup>st</sup> Review	20	20	40	Report	20
2 <sup>nd</sup> Review	20	20	40	Total	100
Total			100		

**TOTAL (P:120) = 120 PERIODS**

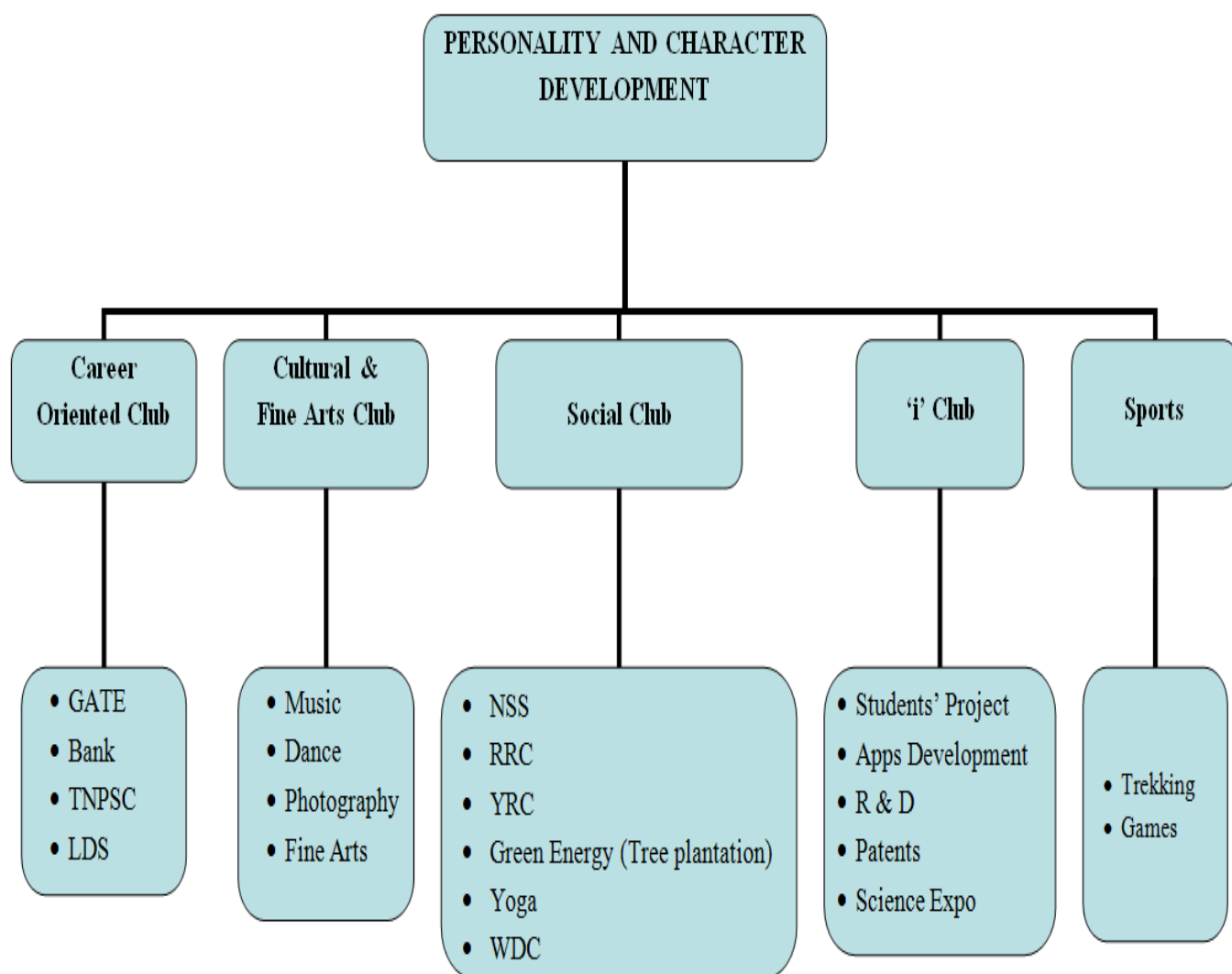
### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x										x
2			x	x	x		x	x				
3								x	x			
4			x	x	x						x	
5						x				x		



## 15GE711 PERSONALITY AND CHARACTER DEVELOPMENT

L T P C  
0 0 1 0



\*LDS - Leadership Development Skills

OBJECTIVES :				
Career Oriented Club	Cultural & Fine Arts Club	Social Club	'i' club	Sports
<ul style="list-style-type: none"> <li>•To provide support for identifying specific career field of interests and career path</li> <li>•To provide support for preparing for competitive exams</li> </ul>	<ul style="list-style-type: none"> <li>•To bring out the hidden talent of students in music, dance and other fine arts.</li> <li>•To promote photography skill among the students</li> <li>•To develop and enhance the performance of students by participating in various events</li> <li>•To inculcate managerial capabilities such as event management and stage organization</li> </ul>	<ul style="list-style-type: none"> <li>•To create social awareness and develop a sense of social and civic responsibility</li> <li>•To inculcate socially and environmentally sound practices and be aware of the benefits</li> <li>•To encourage the students to work along with the people in rural areas, thereby developing their character, social consciousness, commitment, discipline and being helpful towards the community.</li> </ul>	<ul style="list-style-type: none"> <li>•To inculcate the basic concepts of innovation</li> <li>•To foster the networking between students, build teams, exchange ideas, do projects and discuss entrepreneurial opportunities</li> <li>•To enrich the academic experience, build competencies and relationships beyond the classroom</li> </ul>	<ul style="list-style-type: none"> <li>•To provide opportunities to excel at sports</li> <li>•To promote an understanding of physical and mental well-being through an appreciation of stress, rest and relaxation.</li> <li>•To develop an ability to observe, analyze and judge the performance of self and peers in sporting activities.</li> <li>•To develop leadership skills and nurture the team building qualities. <b><u>Trekking:</u></b></li> <li>•To provide opportunities to explore nature and educating about the purity of nature</li> <li>•To improve physical and mental health.</li> </ul>

<b>OUTCOMES</b> : At the end of this course, the students will be able to				
<ul style="list-style-type: none"> <li>•Find a better career of their interest.</li> <li>•Make use of their knowledge during competitive exams and interviews.</li> </ul>	<ul style="list-style-type: none"> <li>•Take part in various events</li> <li>•Develop team spirit, leadership and managerial qualities</li> </ul>	<ul style="list-style-type: none"> <li>•Develop socially responsive qualities by applying acquired knowledge</li> <li>•Build character, social consciousness, commitment and discipline</li> </ul>	<ul style="list-style-type: none"> <li>•Apply the acquired knowledge in creating better solutions that meet new requirements and market needs</li> <li>•Develop skills on transforming new knowledge or new technology into viable products and services on commercial markets as a team</li> </ul>	<ul style="list-style-type: none"> <li>•Demonstrate positive leadership skills that contribute to the organizational effectiveness</li> <li>•Take part an active role in their personal wellness (emotional, physical, and spiritual) that supports a healthy lifestyle</li> <li>•Create inclination towards outdoor activity like nature study and Adventure.</li> </ul>

**TOTAL [4 x (P: 15)]: 60 PERIODS**

**(Cumulatively for Four Semesters)**

## 15CS831 PROJECT WORK II

L	T	P	C
0	0	16	8

### COURSE OBJECTIVE:

- To identify the problem in the specific domain or enhance the existing product to the next level.
- To learn how to formulate solution for the problem.
- To be trained to function effectively as an individual and a member in diverse teams.
- To interpret and justify the experimental results
- To develop an effective communication and be trained to write dissertation report

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Demonstrate a sound technical knowledge of their selected project topic.
- CO2 Undertake problem formulation and solution legally for the sustainable development.
- CO3 Develop an attitude of team work and independent working on real time problems.
- CO4 Design engineering solutions to complex problems based on engineering and management principles.
- CO5 Communicate with engineers and the community at large in written and oral forms.

### THE PROJECT INVOLVES THE FOLLOWING

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. 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. Either second or third review is evaluated by an industry expert. Finally, prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners.

### PROJECT WORK WILL BE EVALUATED BY CONTINUOUS ASSESSMENT AND END SEMESTER ASSESSMENT

Continuous Assessment - 50 Marks				End Semester Assessment - 50 Marks	
	Guide	Committee	Total	Internal Examiner	40
0 <sup>th</sup> Review	10	10	20	External Examiner	40
1 <sup>st</sup> Review	20	20	40	Report	20
2 <sup>nd</sup> Review	20	20	40	Total	100

**TOTAL (P: 240) = 240 PERIODS**

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x										x
2			x	x	x		x	x				
3								x	x			
4			x	x	x						x	
5						x				x		



## 15CSX01 DATA SCIENCE

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand the Lifecycle of data science projects.
- To apply various techniques for mining data stream.
- To analyze the data using classification techniques.
- To understand the clustering and analysis methods.
- To apply visualization techniques to clearly communicate analytic insights to business sponsors, analytic audiences and use tools like Hadoop, Giraph

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Know the basics of data science and big data field.
- CO2 Design efficient techniques for mining large volumes of data in engineering applications.
- CO3 Deploy the technique of classification and prediction in data science
- CO4 Understand about the clusters and analyze the big data for useful business applications.
- CO5 Apply tools like Hadoop, Giraph and storm to implement real time applications.

### UNIT I INTRODUCTION (9)

Data Science – Related fields – Data Scientist – Roles - Data mining – limits on data mining - Big Data - Computing Environment - NoSQL Stores – Hadoop and Map Reduce Architecture - Life cycle of data science project.

### UNIT II DATA AND RELATIONS (9)

Data scales - Set and Matrix Representations - Relations - Similarity Measures - Dissimilarity Measures - Sequence Relations - Sampling and Quantization.

### UNIT III CLASSIFICATION (9)

Criteria, Naive Bayes Classifier, Linear Discriminant Analysis, Regression - Support Vector Machine, Nearest Neighbor Classifier, Learning Vector Quantization, Decision Trees.

### UNIT IV CLUSTERING AND ANALYSIS (9)

Cluster analysis - K-means - Hierarchical clustering - Time series analysis - Recommendation Systems - Text analysis.

### UNIT V DATA VISUALIZATION AND ENGINEERING (9)

Diagrams, Principal Component Analysis- Multidimensional Scaling - Histograms - Spectral Analysis - MapReduce - Bulk Synchronous Parallel Distributed Computation - Event Processing - Case Studies: Hadoop, Giraph, Storm.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Thomas. A. Runkler 2012, "Data Analytics: Models and algorithms for Intelligent Data Analysis", Springer, Germany.
2. Jared Dean 2014, "Big Data, Data Mining and Machine learning", Wiley publications.

### REFERENCES:

1. Anand Rajaraman and Jeffrey David Ullman, 2011, "Mining of Massive data sets", Cambridge University press.
2. Donald Miner, Map Reduce Design Patterns: "Building Effective Algorithms and Analytics for Hadoop and Other Systems", O'Reilly Media, 2012.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x							x
2	x	x	x	x	x							x
3	x	x	x	x	x							x
4	x	x	x	x	x							x
5	x	x	x	x	x							x



## 15CSX02 DATA WAREHOUSING AND DATA MINING

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand the basic principles, concepts and applications of data warehousing and data mining.
- To enlighten the concepts of data warehousing and architecture of data mining.
- To make the students to understand association rule mining.
- To learn the importance of supervised learning and relevant algorithms.
- To learn the importance of unsupervised learning algorithms and recent trends..

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Identify and use of various data warehousing components functionalities
- CO2 Analyze the techniques of data mining and data warehousing models.
- CO3 Design, implement and evaluate a system using association mining,
- CO4 Apply and work with classification and Prediction algorithms.
- CO5 Apply and work with clustering algorithms and recent trends.

### UNIT I DATA WAREHOUSING

(9)

Need for Data Warehousing – Data Warehouse Architecture –Multidimensional Data Model –Schemas for Multidimensional Data Model- OLAP Operations – Types of OLAP Server – Data warehouse Implementation.

### UNIT II DATA MINING CONCEPTS

(9)

Introduction to Data mining – Types of Data –Functionalities of data mining- Architecture of a typical data mining system– Statistical Descriptions of Data – Data Visualization – Major Issues in Data Mining – Data Preprocessing: Data Cleaning – Data Integration – Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

### UNIT III FREQUENT PATTERN MINING

(9)

Basic Concepts – Market Basket Analysis – Frequent Item Set Mining Methods – Apriori Algorithm – FP Growth Algorithm – Pattern Evaluation Methods–Correlation Analysis –Mining multilevel and multidimensional associations

### UNIT IV CLASSIFICATION AND PREDICTION

(9)

Issues Regarding Classification and Prediction – Decision Tree Induction– Bayesian Classification – Rule–Based Classification – Other Classification Methods– Prediction: Linear – Non Linear Regression– Accuracy and Error Measures.

### UNIT V CLUSTERING AND TRENDS IN DATA MINING

(9)

Cluster Analysis: Basic Concepts – Partitioning Methods – Hierarchical Methods – Density Based Methods – Outlier Analysis – Distance – Based Outlier Detection – Density – Based Outlier Detection – Data Mining Trends: Mining Complex Data Types – Applications Of Data Mining.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Han Jiawei and Kamber Micheline, "Data Mining: Concepts and Techniques", Harcourt India India / Morgan Kauffman Pvt Ltd., New Delhi, 3<sup>rd</sup> ed., 2012.

### REFERENCES:

1. Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, Prentice Hall 2006  
G. K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India, 2006.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x											
2	x	x	x								x	x
3	x	x	x	x		x					x	x
4	x	x	x	x		x					x	x
5	x	x	x	x	x	x					x	x



## 15CSX03 ADVANCED DATABASE TECHNOLOGIES

L	T	P	C
3	0	0	3

**PREREQUISITE:** Database systems

**OBJECTIVE:**

- To acquire knowledge on parallel and distributed databases and its applications.
- To study the usage and applications of Object Oriented database
- To understand the usage of advanced data models.
- To acquire inquisitive attitude towards research topics in databases like cloud database and NoSQL.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1 Select the appropriate high performance database architecture.
- CO2 Use and design distributed database system.
- CO3 Model and represent the real world data using object oriented database.
- CO4 Work with cloud databases.
- CO5 Work with NoSQL database.

**UNIT I PARALLEL DATABASES**

(9)

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems

**UNIT II DISTRIBUTED DATABASES**

(9)

Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Case Studies

**UNIT III OBJECT BASED DATABASES**

(9)

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL .

**UNIT IV CLOUD DATABASE**

(9)

Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models- Query Languages- Introduction to Big Data-Storage

**UNIT V NOSQL**

(9)

NoSQL Introduction – Differences from relational databases – Column family store- Document stores – key-value databases – Graph databases – Choosing a NoSQL database.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", 6<sup>th</sup> ed., McGraw Hill.
2. Eric Redmond; Jim R. Wilson. Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement. Pragmatic Bookshelf. 2012.
3. Pramod J. Sadalage; Martin Fowler. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. Addison-Wesley. 2012.

**REFERENCES:**

1. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", 6<sup>th</sup> ed., Pearson Education.
2. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", 8<sup>th</sup> ed., Pearson Education.
3. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", 6<sup>th</sup> ed., Pearson Education / Addison Wesley.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x						x	x
2	x	x	x	x	x						x	x
3		x	x	x	x			x	x		x	x
4	x	x	x	x	x						x	x
5	x	x	x	x	x			x	x		x	x



## 15CSX04 DATA ANALYTICS

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To be exposed to big data
- To learn the different ways of Data Analysis
- To be familiar with data streams
- To learn the mining and clustering
- To be familiar with the visualization

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Apply the statistical analysis methods.
- CO2 Compare and contrast various soft computing frameworks.
- CO3 Design distributed file systems.
- CO4 Apply Stream data model.
- CO5 Use Visualization techniques

### UNIT I INTRODUCTION TO BIG DATA (8)

Introduction to Big Data Platform – Challenges of conventional systems - Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting - Modern data analytic tools, Statistical concepts: Sampling distributions, resampling, statistical inference, prediction error.

### UNIT II DATA ANALYSIS (12)

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics - Rule induction - Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods

### UNIT III MINING DATA STREAMS (8)

Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window - Realtime Analytics Platform(RTAP) applications - case studies - real time sentiment analysis, stock market predictions.

### UNIT IV FREQUENT ITEMSETS AND CLUSTERING (9)

Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K-Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

### UNIT V FRAMEWORKS AND VISUALIZATION (8)

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2013.
2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

**REFERENCES:**

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analytics, John Wiley & Sons, 2012.
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
3. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", 2<sup>nd</sup> ed., Elsevier, Reprinted 2008.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									
2	x		x	x							x	
3	x	x	x		x							x
4	x		x		x							x
5	x		x		x							x



## 15CSX05 HIGH PERFORMANCE NETWORKS

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To have a thorough understanding of the various packet switched networks.
- To study in detail about the concepts of ATM and Frame relay.
- To study the overview of ISDN & B-ISDN architecture
- To discuss in detail about the Wi-MAX and UWB.
- To study in detail bluetooth technology and its protocols.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Understand the strong foundation of OSI model and various protocols used in each layer
- CO2 Be familiar with ATM networks and its layers.
- CO3 Able to analyze various memory hierarchies both internal and external.
- CO4 Students will have a thorough knowledge in Wi-MAX and UWB.
- CO5 Analyze various protocols used in Bluetooth technology.

### UNIT I PACKET SWITCHED NETWORKS (9)

OSI and IP models – Ethernet (IEEE 802.3) – Token ring (IEEE 802.5) – FDDI – DQDB – SMDS: Internetworking with SMDS. Wireless LAN (IEEE 802.11).

### UNIT II CIRCUIT SWITCHED NETWORKS (9)

SONET - Dense Wave Division Multiplexing (DWDM) – Digital Subscriber Line (DSL) – Intelligent Network Architecture - CATV.

### UNIT III ATM NETWORKS (9)

ATM: Main Features of ATM – Addressing, signaling and routing – ATM Header Structure – Adaptation Layer – Management and control – Internetworking with ATM.

### UNIT IV OPTICAL NETWORKS (9)

Optical Links - WDM Systems – Optical Cross Connects - Optical LANs - Optical Paths and Networks - Ring Networks – Hierarchical Mesh Networks – Optical Networks

### UNIT V ULTRA WIDEBAND (UWB) AND WIMAX (9)

UWB: Introduction – Time-hopping ultra wide band – Direct Sequence Ultra Wideband – Multiband – Other Types of UWB. WiMAX: Introduction – WiMAX Overview – Competing Technologies – Overview of the Physical Layer – PMP Mode – Mesh Mode – Multi hop Relay Mode.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Walrand .J. Varatya, "High performance communication network", Morgan Kauffman Harcourt Asia Pvt.Ltd. 2<sup>nd</sup> ed., 2000.
2. David tung chong wong, Peng-yong kong, Ying-chang liang, Kee chaing chua and Jon W. Mark, "Wireless Broadband Networks," John Wiley & Sons, 2009.

### REFERENCES:

1. William Stallings, "ISDN and Broadband ISDN with Frame Relay and ATM", 4<sup>th</sup> ed., Pearson education Asia, 2002.
2. Jennifer Bray and Charles F. Sturman, "Blue Tooth" Pearson education Asia, 2001.
3. Shahin Farahani, "ZigBee Wireless Networks and Transceivers", Elsevier Ltd, 2008.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x					x	x		x	x	
2	x	x					x	x			x	
3	x	x	x		x		x	x			x	
4	x	x	x		x		x	x	x	x	x	
5	x		x		x		x	x	x	x	x	



## 15CSX06 TCP/IP DESIGN AND IMPLEMENTATION

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand the concept of internet protocols.
- To study about TCP/IP application services.
- To absorb the fundamentals of network design and implementation with IP.
- To learn design and implement of network applications using TCP.
- To know about congestion avoidance techniques.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Gain knowledge in communication protocols.
- CO2 Establish TCP connection.
- CO3 Acquire knowledge in fundamentals of IP addresses and IP routing.
- CO4 Analyze and implement TCP in real time environment.
- CO5 Outline an insight of congestion avoidance and control.

### UNIT I INTRODUCTION

(9)

Internetworking concepts and architecture model – Classful Internet address – CIDR – Sub netting and Super netting – AARP – RARP- IP- IP Routing – ICMP – IPV6.

### UNIT II TCP

(9)

Services – Header – Connection establishment and termination – Interactive data flow – Bulk data flow – Timeout and retransmission – Persist timer – Keep alive timer.

### UNIT III IP IMPLEMENTATION

(9)

IP global software organization – Routing table – Routing algorithms – Fragmentation and reassembly – Error processing (ICMP) – Multicast Processing (IGMP).

### UNIT IV TCP IMPLEMENTATION I

(9)

Data structure and input processing – Transmission control blocks – Segment format – Comparison – Finite state machine implementation – Output processing – Mutual exclusion – TCP Data length.

### UNIT V TCP IMPLEMENTATION II

(9)

Timers – Events and Messages – Timer process – Deleting and inserting timer event – Flow control and adaptive retransmission– Congestion avoidance and control – Urgent data processing and push function.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Douglas E Comer, "Internetworking with TCP/IP Principles, Protocols and Architecture", Vol. 1, 5<sup>th</sup> ed., 2013.
2. Douglas E Comer, "Internetworking with TCP/IP Vol. II: ANSI C Version: Design, Implementation and Internals: 2", 3<sup>rd</sup> ed., 2009.

**REFERENCES:**

1. W.Richard Stevens "TCP/IP Illustrated" Vol. 1, Pearson Education, 2011.
2. W.Richard Stevens "TCP/IP Illustrated" Vol. 2, Pearson Education 2013.
3. Forouzan, "TCP/ IP Protocol Suite", 3<sup>rd</sup> ed., Tata McGraw Hill, 2005.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									x
2	x	x	x		x				x			x
3	x	x	x		x	x	x		x			x
4	x											x
5	x		x		x	x	x		x			x



## 15CSX07 DISTRIBUTED SYSTEMS

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To study the core ideas behind modern coordination and communication paradigms and distributed data structures
- To realize not only the basic principles but also the best practice engineering techniques of concurrent and distributed computing
- To present the techniques to formally study the safety and progress properties of concurrent and distributed algorithms
- To analyze the performance of synchronization in distributed systems
- To handle transactions and deadlocks in distributed systems in engineering applications

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Understand the differences among: concurrent, networked, distributed, and mobile systems.
- CO2 Use communication between distributed objects by Remote procedure calls in real time applications.
- CO3 Design distributed systems based on security, file systems architecture in distributed operating system.
- CO4 Understand the event synchronization and distributed mutual exclusion problems.
- CO5 Apply transactions and deadlock handling techniques in distributed systems in engineering applications.

### UNIT I BASIC CONCEPTS

(9)

Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols – Case Studies

### UNIT II COMMUNICATION AND DISTRIBUTED OBJECTS

(9)

Inter-process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client-Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI

### UNIT III SECURITY AND DISTRIBUTED FILE SYSTEMS

(9)

Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System

### UNIT IV SYNCHRONIZATION IN DISTRIBUTED SYSTEMS

(9)

Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – X.500 Directory Service – Clocks – Events and Process States – Synchronizing Physical Clocks – Logical Time And Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Elections

### UNIT V DISTRIBUTED TRANSACTION PROCESSING

(9)

Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols – Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", 4<sup>th</sup> ed., Pearson Education, 2009.
2. Andrew S. Tanenbaum, Maarten van Steen, "Distributed Systems, Principles and Paradigms", Pearson Education, 2013.

**REFERENCE BOOKS:**

1. Sape Mullender, "Distributed Systems", 2<sup>nd</sup> ed., Addison Wesley, 1993.
2. Albert Fleishman, Distributes Systems, "Software Design and Implementation", Springer, Verlag, 1994.
3. M. L. Liu, "Distributed Computing Principles and Applications", Pearson Education, 2007.
4. Mugesh Singhal, Niranjana G Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw Hill Edition, 2008.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x								x
2	x	x	x	x	x							x
3	x	x	x	x	x							x
4	x	x	x	x	x							x
5	x	x	x	x	x							x



## 15CSX08 NETWORK ANALYSIS AND MANAGEMENT

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To be familiar with basics of network design and requirement analysis.
- To understand the network flow analysis.
- To be aware of network logical design.
- To understand network management and security concepts.
- To understand network physical design and routing.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Explain basics of network design and requirement analysis.
- CO2 Apply a range of techniques for characterizing network structure.
- CO3 Discuss methodologies for developing logical design of networks.
- CO4 Explore the network management and security concepts.
- CO5 Apply network physical design and routing for building networking applications.

### UNIT I A SYSTEM APPROACH TO NETWORK DESIGN AND REQUIREMENT ANALYSIS (9)

Introduction - Network Service and Service based networks - Systems and services- characterizing the services. Requirement Analysis: Concepts – Background – User Requirements- Application Requirements- Host Requirements-Network Requirements – Requirement Analysis: Guidelines – Requirements gathering and listing- Developing service metrics to measure performance – Characterizing behavior- Developing performance threshold – Distinguish between service performance levels.

### UNIT II FLOW ANALYSIS: CONCEPTS, GUIDELINES AND PRACTICE (9)

Background- Flows - Data sources and sinks - Flow models- Flow boundaries - Flow distributions - Flow specifications - Applying the flow model - Establishing flow boundaries - Applying flow distributions - Combining flow models, boundaries and distributions - Developing flow specifications - Prioritizing flow simplifying flow analysis process – Examples of applying flow specs - Case study.

### UNIT III LOGICAL DESIGN: CHOICES, INTERCONNECTION MECHANISMS (9)

Background - Establishing design goals - Developing criteria for technology evolution - Making technology choices for design-case study - Shared Medium - Switching and Routing: Comparison and contrast- Switching- Routing- Hybrid Routing/Switching Mechanisms – Applying Interconnection Mechanism to Design

### UNIT IV LOGICAL DESIGN: NETWORK MANAGEMENT AND SECURITY (9)

Integrating Network management and security into the Design- Defining Network Management- Designing with manageable resources- Network Management Architecture- Security- Security mechanism- Examples- Network Management and security plans- Case study.

### UNIT V NETWORK DESIGN: PHYSICAL, ADDRESSING AND ROUTING (9)

Introduction- Evaluating cable plant design options – Network equipment placement- Diagramming the physical design- Diagramming the worksheet – Case study. Introduction to Addressing and routing establishing routing flow in the design environments - Manipulating routing flows - Developing addressing strategies - Developing a routing strategy - Case study.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. James.D.McCabe, "Practical Computer Network Analysis and Design", 1<sup>st</sup> ed., Morgan Kaufman, 1997.

**REFERENCES:**

1. J.Radz,"Fundamentals of Computer Network Analysis and Engineering: Basic Approaches for Solving Problems in the Networked Computing Environment", Universe, 2005.
2. Laura Chappel and Gerald Combs ,"Wireshark 101: Essential Skills for Network Analysis",Kindle Edition,2013.
3. Daw Sudira, "Network Management", Sonali Publications, 2004.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x								x	x
2	x	x	x	x								
3	x	x	x	x								
4			x			x	x	x				
5	x	x	x	x	x							



## 15CSX09 WIRELESS COMMUNICATION AND NETWORKS

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To introduce the concepts of analog and digital transmission.
- To know cellular wireless medium access.
- To understand the wireless network protocol.
- To enhance the understanding on various network standards.
- To realize bluetooth concepts.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Learn the terms used in wireless communication.
- CO2 Derive the right of entry about wireless medium propagation.
- CO3 Design wireless network with the concept of satellite and mobility.
- CO4 Apply various wireless IEEE standards to the real world network entity.
- CO5 Compare the evaluation of wireless network communication by means of Bluetooth.

### UNIT I TECHNICAL BACKGROUND

(9)

Introduction- Wireless Comes of Age, The cellular Revolution, The Global Cellular Network, Broad band, Future Trends, Transmission Fundamentals-Signals for Conveying Information, Analog and Digital Data Transmission, Channel Capacity, Transmission Media.

### UNIT II WIRELESS COMMUNICATION TECHNOLOGY

(9)

Cellular Wireless Networks-Principal, Generation. Antennas and Wave Propagation-Antennas, Propagation Modes, Line-of-Sight Transmission, Fading in the Mobile Environment.

### UNIT III WIRELESS NETWORKING

(9)

Satellite Communications- Parameters and Configurations, Capacity Allocations. Wireless Systems Operations and Standards- Cordless Systems, Wireless Local Loop, WiMAX and IEEE 802.16 Broadband wireless Access Standards. Mobile IP and Wireless Application Protocol-Mobile IP, Wireless Application Protocol.

### UNIT IV WIRELESS LAN

(9)

Technology- Overview, Infrared LANs, Spread Spectrum LANs, Narrowband Microwave LANs. Wi-Fi and IEEE 802.11 Wireless LAN Standards- IEEE 802 Architecture, IEEE 802.11 Architecture and Services, Medium Access Control, Physical Layer, Other IEEE 802.11 Standards, Wi-Fi protected Access.

### UNIT V BLUETOOTH AND IEEE 802.15

(9)

Overview, Radio Specifications, Baseband Specifications, Link Manager Specifications, Logical Link Control and Adaptation Protocol, IEEE 802.15

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. William Stallings "Wireless Communications and Networks", Pearson Education, 2<sup>nd</sup> ed., 2009.

**REFERENCES:**

1. Kaveh Pahlavan, K.Prasanth Krishnamurthy, "Principles of Wireless Networks", Pearson Education Asia, 2002.
2. Andrea Goldsmith, "Wireless Communications", Cambridge University Press, 2007.
3. William Stallings, "Wireless Communications and networks", Pearson/Prentice Hall of India, 2nd Ed., 2007.
4. T.S.Rappaport, "Wireless Communications: Principles & Practice", 2<sup>nd</sup> ed., Prentice Hall of India, 2005

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x									x	x
2	x	x	x	x	x							x
3	x	x		x								x
4		x	x	x	x	x		x				x
5	x	x			x	x	x	x				x



## 15CSX10 THEORY OF COMPUTATION

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To provide an understanding of the basic concepts in theoretical computer science.
- To comprehend complex concepts and formal proofs in theoretical computer science in order to improve reasoning and problem solving skills.
- To get ready for more advanced courses in automation theory, formal languages, algorithms & logic.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Learn the key properties of formal languages and finite automata.
- CO2 Design and describe the strings recognized by regular languages.
- CO3 Understand the properties of context-free languages and grammars.
- CO4 Design a turing machine and push down automata that accomplish a specific task.
- CO5 Demonstrate the undecidable and intractable classes of problems.

### UNIT I AUTOMATA

(9)

Introduction to finite automata(FA) – Central concepts of automata theory – Deterministic finite automata – Non deterministic finite automata – Finite automata with epsilon transitions – Equivalence between epsilon NFA and DFA - Minimization of automata.

### UNIT II REGULAR EXPRESSIONS

(9)

Regular expressions(RE) - Manipulation of regular expressions - Equivalence between RE and FA - Inter conversion - Pumping lemma - Closure properties of regular sets – Decision properties of Regular Languages.

### UNIT III CONTEXT FREE GRAMMAR

(9)

Context free Grammars (CFG) - Derivation trees - Ambiguity in Context-Free Grammars - Applications of Context Free Grammars - Normal Forms - Chomsky Normal Form (CNF) - Greibach Normal Form (GNF).

### UNIT IV PUSH DOWN AUTOMATA AND TURING MACHINE

(9)

Push Down Automata (PDA) – Languages of PDA – Equivalence of PDA's and CFG's - Turing Machine, Programming techniques of Turing Machine – Types of Turing Machine.

### UNIT V CLASSES OF PROBLEMS

(9)

A language that is not Recursively Enumerable – Universal Turing Machine – Rice's Theorem and properties of the Recursively Enumerable Languages – Post's Correspondence Problem (PCP) – Modified PCP – The Classes P and NP – An NP Complete Problem.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. John E Hopcroft, Rajeev Motwani, Jeffrey D Ullman,," Introduction to Automata Theory, Languages, and Computation", 3<sup>rd</sup> ed., Pearson, 2013.
2. John C Martin, "Introduction to Languages and the Theory of Computation", 4<sup>th</sup> ed., Tata McGraw Hill Publishing Company, New Delhi, 2010

### REFERENCES:

1. Kamala Krithivasan and Rama. R, "Introduction to Formal Languages, Automata Theory and Computation", Pearson Education 2009.
2. Lewis H.P. & Papadimitriou C.H., "Elements of Theory of Computation", Prentice Hall of India, 4<sup>th</sup> ed., 2007.
3. Mishra K L P and Chandrasekaran N, "Theory of Computer Science - Automata, Languages and Computation", Prentice Hall of India, New Delhi, 3<sup>rd</sup> ed., 2004.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x										
2	x	x	x	x								
3	x	x	x	x		x			x		x	
4	x	x	x	x		x			x		x	
5		x	x	x	x				x		x	



## 15CSX11 GRAPH THEORY

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To be familiar with the most fundamental Graph Theory topics and results.
- To study about the different mathematical notations.
- To be exposed to the techniques of proofs and analysis.
- To understand how to combine the theoretical and mathematical concepts using graph theory.
- To understand about the mathematical proofs.

### COURSE OUTCOMES:

At the end 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 and to distinguish examples from non-examples.
- CO3 Validate and critically assess a mathematical proof.
- CO4 Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
- CO5 Reason from definitions to construct mathematical proofs.

### 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, CONNECTIVITY & PLANARITY (9)

Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – Cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism - 2- Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.

### UNIT III MATRICES, 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.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Dover edition, 2016.
2. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley, 1994.

**REFERENCES:**

1. Clark J. and Holton D.A, "A First Look at Graph Theory", Allied Publishers, 1995.
2. Mott J.L., Kandel A. and Baker T.P. "Discrete Mathematics for Computer Scientists and Mathematicians", Prentice Hall of India, 1996.
3. Liu C.L., "Elements of Discrete Mathematics", Mc Graw Hill, 2013.
4. Rosen K.H., "Discrete Mathematics and Its Applications", Mc Graw Hill, 2007.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x											x
2	x	x	x									x
3	x	x		x								
4	x	x		x	x				x			x
5	x	x	x	x	x							



## 15CSX12 INFORMATION RETRIEVAL TECHNIQUES

L	T	P	C
3	0	0	3

### OBJECTIVE:

- Learn the information retrieval models.
- Be familiar with web search engine.
- Be exposed to link analysis.
- Understand hadoop and map reduce.
- Learn document text mining techniques.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Apply information retrieval models.
- CO2 Design web search engine.
- CO3 Use link analysis.
- CO4 Use hadoop and map reduce.
- CO5 Apply document text mining techniques.

### UNIT I INTRODUCTION (9)

Introduction - History of IR - Components of IR - Issues – Open source search engine frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR versus web search - Components of a search engine - Characterizing the web.

### UNIT II INFORMATION RETRIEVAL (9)

Boolean and vector - Space retrieval models - Term weighting - TF-IDF weighting - Cosine similarity - preprocessing - Inverted indices - Efficient processing with sparse vectors – Language model based IR - Probabilistic IR –Latent semantic Indexing - Relevance feedback and query expansion.

### UNIT III WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING (9)

Web search overview, web structure, the user, paid placement, search engine optimization/ spam - Web size measurement - Search engine optimization/spam – Web search architectures - Crawling - Meta-crawlers- Focused crawling - Web indexes – Near-duplicate detection - Index compression - XML retrieval.

### UNIT IV WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH (9)

Link analysis –hubs and authorities – Page rank and HITS algorithms - Searching and Ranking – Relevance scoring and ranking for Web – Similarity - Hadoop & Map Reduce - Evaluation - Personalized search - Collaborative filtering and content - Based recommendation of documents and products – Handling “invisible” Web - Snippet generation, Summarization, Question answering, Cross- Lingual retrieval.

### UNIT V DOCUMENT TEXT MINING (9)

Information filtering: organization and relevance feedback – Text mining - Text classification and clustering - Categorization algorithms: Naive bayes - Decision trees - Nearest neighbor – Clustering algorithms: agglomerative clustering - k-means - Expectation Maximization (EM).

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. C. Manning, P. Raghavan, and H. Schütze, “Introduction to Information Retrieval”, Cambridge University Press, 2008.
2. Ricardo Baeza -Yates and Berthier Ribeiro - Neto, “Modern Information Retrieval: The Concepts and Technology behind Search”, 2<sup>nd</sup> ed., ACM Press Books 2011.
3. Bruce Croft, Donald Metzler and Trevor Strohman, “Search Engines: Information Retrieval in Practice”, 1<sup>st</sup> ed., Addison Wesley, 2009.
4. Mark Levene, “An Introduction to Search Engines and Web Navigation”, 2<sup>nd</sup> ed., Wiley, 2010.

**REFERENCES:**

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, "Information Retrieval: Implementing and Evaluating Search Engines", the MIT Press, 2010.
2. Ophir Frieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series ", 2<sup>nd</sup> ed., Springer, 2004.
3. Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", and 1<sup>st</sup> ed., Gate Mustru Publishing, 2008.

**Mapping of Course Outcome and Programme Outcome**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x											
2	x	x	x		x							x
3	x			x								
4	x		x	x								
5	x	x	x	x	x	x						x



## 15CSX13 MOBILE APPLICATION DEVELOPMENT

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### OBJECTIVE:

- To understand system requirements for mobile applications.
- To learn suitable design using specific mobile development frameworks.
- To create mobile application design.
- To understand the design using specific mobile development frameworks.
- To know the latest technologies available in mobile application.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Describe the requirements for mobile applications.
- CO2 Explain the challenges in mobile application design and development.
- CO3 Develop design for mobile applications for specific requirements.
- CO4 Implement the design using Android SDK and using Objective C and iOS.
- CO5 Deploy mobile applications in Android and iPhone.

### UNIT I INTRODUCTION (9)

Introduction to mobile applications – Importance of mobile strategies – Cost of development – Mobile myths – Market and business drivers for mobile applications – Mobile web presence - e-Mobile applications – Benefits of a mobile app.

### UNIT II BASIC DESIGN (9)

Introduction – Mobile user interface design – Understanding mobile application users – Understanding mobile information design – Understanding mobile platforms – Using the tools of mobile interface design.

### UNIT III ADVANCED DESIGN (9)

Choosing a mobile web option – Adaptive mobile websites – Dedicated mobile websites – Mobile web apps with HTML5 – Design patterns for mobile applications – Advanced web service techniques for mobile devices.

### UNIT IV DEVELOPMENT ENVIRONMENT (9)

Android development practices – Android fundamentals – Android SDK – Common interactions – Offline storage – iOS SDK – Debugging iOS apps – Objective – C basics – iOS features.

### UNIT V TECHNOLOGY (9)

Using google maps – GPS – WiFi and WiMAX – Integration with social media applications – Foldable displays – Centralized storage – Mobile commerce.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012.

### REFERENCES:

1. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012.
2. James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012.
3. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS6 Development: Exploring the iOS SDK", Apress, 2013.
4. <http://developer.android.com/develop/index.html>.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x		x							x
2			x	x							x	
3		x	x		x							x
4	x	x	x		x							x
5	x			x					x		x	x



## 15CSX14 HUMAN COMPUTER INTERACTION

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand fundamentals of human computer interaction.
- To design various models for interaction.
- To Learn design techniques and fundamentals of Human Computer Interaction.
- To know various types of existing interfaces and evaluation techniques.
- To understand applications of HCI in emerging trends.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Understand the requirements and specifications for the interaction design.
- CO2 Analyze the evaluation techniques of human interaction.
- CO3 Determine the most appropriate HCI methods to meet the needs of a practical software development Project.
- CO4 Identify, analyzes, formulate and solve engineering problems.
- CO5 Understand the impact of engineering solutions in a global, economic, environmental, and societal context.

### UNIT I INTRODUCTION:THE HUMAN AND COMPUTER (9)

The Human: Introduction – Input /Output Channels – Human memory – Thinking: reasoning and problem solving – Individual differences – Psychology and the design of interactive systems –The computer: Introduction – Text entry devices – Positioning – Pointing and drawing – Paper: printing and scanning – Memory – Processing and networks.

### UNIT II INTERACTION AND INTERFACES (9)

The Interaction: Introduction – Models of interaction – Frameworks and HCI – Ergonomics – Interaction styles – Elements of the WIMP interface – Interactivity –The context of the interaction – Experience – Engagement and fun – Paradigms: Introduction – Paradigm for interaction – Expressive interfaces – models of emotions – interface types.

### UNIT III DESIGNING RULES (9)

Interaction design basics: Introduction –The process of design – User focus–Scenarios – Navigation design – Screen design and layout – Iteration and Prototyping – HCI in the software process: Introduction – The software life cycle – Usability engineering – Iterative design and prototyping – Design rationale – Design rules: Introduction – Principles to support usability – Standards – Guidelines – Golden rules and heuristics –HCI patterns.

### UNIT IV MODELS AND EVALUATION FRAMEWORK (9)

Cognitive models: Introduction – Goal and task hierarchies – Linguistic models – The challenge of display – based systems – Physical and device models – cognitive architecture – Communication and collaboration model: Introduction – Face-to-face communication – Conversation – Text-based communication – Group working –Models of the system: Introduction – Standard Formalism – Interactive models – Continuous behavior.

### UNIT V INTERFACING APPLICATIONS (9)

Groupware: Introduction – Groupware systems – Computer – mediated communication – Meeting and decision support systems – Shared applications and artifacts – Frameworks for groupware – Implementing synchronous groupware – Hypertext – multimedia and the World Wide Web: Introduction – Understanding hypertext – Finding things – Web technology and issues – Static web content – Dynamic web content.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOK:**

1. Alan Dix, Janet Finlay, Gregory D.Abowd and Russell Beale, "Human-Computer Interaction", Prentice Hall, 3<sup>rd</sup> ed., 2008.

**REFERENCES:**

1. J. Preece, Y. Rogers, H. Sharp, D. Benyon, S. Holland and T. Carey, "Human-Computer Interaction", Addison Wesley, 1994.
2. Andrew Sears, Julie A. Jacko, "The Human-Computer Interaction Handbook Fundamentals, Evolving Technologies and Emerging Applications", 2<sup>nd</sup> ed., Taylor & Francis Group, 2008.
3. Claude Ghaoui, "Encyclopaedia of Human Computer Interaction", Wiley, 2000.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x	x	x			x	x	x		x
2	x	x		x	x				x	x		x
3			x		x			x			x	x
4					x			x		x		x
5			x	x	x		x				x	x

## 15CSX15 GREEN COMPUTING

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To acquire knowledge to adopt green computing practices.
- To learn about green environment architecture.
- To minimize energy consumption.
- To understand how to reduce the requirements for the disposal of equipment.
- To manage improved environmental sustainability.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Determine green computing technology to reduce paper wastage and carbon footprint.
- CO2 Describe behaviour and capabilities of green assets and processes.
- CO3 Conserve natural resources.
- CO4 Utilize the resources in a socio economic manner.
- CO5 Implement the environmental impacts of green activities.

### UNIT I FUNDAMENTALS (9)

Green IT Fundamentals: Business, IT, and the Environment – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics – Green computing: Carbon Foot Print, Scoop on Power.

### UNIT II GREEN ASSETS AND MODELING (9)

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

### UNIT III RECYCLING AND TELECOMMUTING (9)

Choosing Your Green PC Path: Buying a Green Computer – Recycling Your Computer – Greener Under the Hood: Optimize Your Computer Power Management – Greening Mobile Devices – Telecommuting, Teleconferencing and Teleporting: Making the Case for Telecommuting – Telecomm Central: The Green Home Office – Collaborating and Cloud Computing.

### UNIT IV GREEN COMPLIANCE (9)

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

### UNIT V CASE STUDIES (9)

The Environmentally Responsible Business Strategies Research Survey – Case Study Scenarios for Trial Runs – Case Studies in Applying Green IT Strategies and Applications to a Hospital, Packaging Industry and Telecom Sector.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Bhuvan Unhelkar, "Green IT Strategies and Applications – Using Environmental Intelligence", CRC Press, June 2016.
2. Woody Leonhard, Katherine Murray, "Green Home computing for dummies", August 2009.

**REFERENCES:**

1. John Lamb, "The Greening of IT", Pearson Education, 2009.
2. Jason Harris, "Green Computing and Green IT- Best Practices on regulations & industry", Lulu.com, 2008.
3. Carl Speshocky, "Empowering Green Initiatives with IT", John Wiley & Sons, 2010.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x	x	x	x		x	x	x		x
2	x	x		x	x	x			x	x		x
3			x		x	x		x			x	x
4					x	x		x		x		x
5			x	x	x	x	x				x	x



## 15CSX16 NANO COMPUTING

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To learn nano computing challenges.
- To be familiar with the imperfections.
- To be exposed to reliability evaluation strategies.
- To gain knowledge of nano scale quantum computing.
- To understand molecular computing and optimal computing.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

- CO1 Discuss nano computing challenges.
- CO2 Handle the imperfections.
- CO3 Apply reliability evaluation strategies.
- CO4 Use nano scale quantum computing.
- CO5 Utilize molecular computing and optimal computing.

### UNIT I NANOCOMPUTING-PROSPECTS AND CHALLENGES

(9)

Introduction – History of Computing – Nano computing – Quantum Computers – Nano computing Technologies – Nano Information Processing – Prospects and Challenges – Physics of nano computing : Digital signals and gates – Silicon nano electronics – Carbon nanotube Electronics – Carbon nanotube Field-effect Transistors – Nanolithography.

### UNIT II NANOCOMPUTING WITH IMPERFECTIONS

(9)

Introduction – Nanocomputing in the Presence of Defects and Faults – Defect Tolerance – Towards Quadrillion Transistor Logic Systems.

### UNIT III RELIABILITY OF NANOCOMPUTING

(9)

Markov Random Fields – Reliability Evaluation Strategies – NANOLAB – NANOPRISM – Reliable Manufacturing and Behavior from Law of Large Numbers.

### UNIT IV NANOSCALE QUANTUM COMPUTING

(9)

Quantum Computers – Hardware Challenges to Large Quantum Computers – Fabrication, Test, and Architectural Challenges – Quantum-dot Cellular Automata (QCA) – Computing with QCA – QCA Clocking – QCA Design Rules.

### UNIT V QCADESIGNER SOFTWARE AND QCA IMPLEMENTATION

(9)

Basic QCA Circuits using QCA Designer – QCA Implementation – Molecular and Optical Computing: Molecular Computing – Optimal Computing – Ultrafast Pulse Shaping and Tb/sec Data Speeds.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Sahni V. and Goswami D., Nano Computing, McGraw Hill Education Asia Ltd. (2008), ISBN (13): 978007024892.

### REFERENCES:

1. Sandeep K. Shukla and R. Iris Bahar., Nano, Quantum and Molecular Computing, Kluwer Academic Publishers 2004, ISBN: 1402080670.
2. Sahni V, Quantum Computing, McGraw Hill Education Asia Ltd. 2007.
3. Jean-Baptiste Waldner, Nanocomputers and Swarm Intelligence, John Wiley & Sons, Inc. 2008, ISBN (13): 978-1848210097.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x										
2	x	x	x	x								
3	x	x	x	x					x			
4	x	x	x	x	x				x		x	x
5	x	x	x	x	x				x		x	x



## 15CSX17 KNOWLEDGE MANAGEMENT

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### OBJECTIVE:

- To perceive knowledge on the quality of management decision.
- To learn the major challenges and benefits of each phase of the KM cycle.
- To understand the general taxonomic approaches used in classifying knowledge.
- To study the knowledge codification tools and procedures.
- To know the role of internet and data mining in knowledge transfer.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Analyze the technical components and use of decision support systems.
- CO2 Link the KM frameworks to key KM concepts and the major phases of the KM cycle.
- CO3 Apply general approaches to classify knowledge.
- CO4 Apply tools, techniques, processes used for knowledge codification.
- CO5 Explain the knowledge transfer process.

### UNIT I KNOWLEDGE MANAGEMENT (9)

KM Myths – KM Life Cycle – Understanding Knowledge – Knowledge, Intelligence – Experience – Common Sense – Data, Information, and Knowledge – Types of Knowledge – Expert Knowledge – Human Thinking and Learning.

### UNIT II KNOWLEDGE MANAGEMENT SYSTEM LIFE CYCLE (9)

Challenges in Building KM Systems – KM System Life Cycle – Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation – Knowledge Architecture.

### UNIT III CAPTURING KNOWLEDGE (9)

Evaluating the Expert – Developing a Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge – The Interview as Tool – Guide to a Successful Interview – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis – Consensus Decision making – Delphi Method – Nominal Group Technique – Concept Mapping – Black Boarding.

### UNIT IV KNOWLEDGE CODIFICATION (9)

Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developer's Skill Sets – System Testing and Deployment – Knowledge Testing – Approaches to Logical Testing, User Acceptance Testing – Managing the Testing Phase – User Training – Post Implementation.

### UNIT V KNOWLEDGE TRANSFER AND SHARING (9)

Transfer Methods – Role of the Internet – Knowledge Transfer in E-World – E-Business – KM System Tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Data Management – Role of Data Mining in Customer Relationship.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOK:**

1. Elias. M. Awad & Hassan M. Ghaziri , "Knowledge Management" Pearson Education 2007.

**REFERENCES:**

1. Guus Schreiber, Hans Akkermans, Anjo Anjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, "Knowledge Engineering and Management", Universities Press, 2001.
2. C.W. Holsapple, "Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol. 1 and 2, 2003.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x	x	x	x	x	x	x
2	x	x		x	x							x
3	x	x	x	x	x	x	x	x	x	x	x	x
4	x	x	x	x	x	x	x	x	x	x	x	x
5	x				x						x	x

## 15CSX18 EMBEDDED SYSTEMS

L	T	P	C
3	0	0	3

### OBJECTIVE:

- Learn the architecture and programming of ARM processor.
- Be familiar with the embedded computing platform design and analysis.
- Be exposed to the basic concepts of real time Operating system and distributed embedded systems
- Learn to do embedded program using Arduino.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Describe the architecture and programming of ARM processor.
- CO2 Outline the concepts of embedded systems
- CO3 Explain the basic concepts of real time Operating system design and distributed embedded systems.
- CO4 Develop Arduino applications.
- CO5 Model real-time applications using embedded-system concepts

### UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS (9)

Complex systems and micro processors – Embedded system design process – Design example: Model train controller - Instruction sets preliminaries - ARM Processor – CPU: programming input and output - Supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

### UNIT II EMBEDDED COMPUTING PLATFORM DESIGN (9)

The CPU Bus - Memory devices and systems – Designing with computing platforms – Consumer electronics architecture – Platform-level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading – Compilation techniques - Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size - Program validation and testing.

### UNIT III DISTRIBUTED EMBEDDED SYSTEMS AND REAL TIME OPERATING SYSTEMS (9)

Distributed embedded systems – Network abstractions – CAN bus – Distributed computing in cars and airplanes – I<sup>2</sup>C bus - MPSoCs and shared memory multiprocessors - Real time operating systems - POSIX - Windows CE

### UNIT IV ARDUINO PROGRAMMING (9)

Introduction to Arduino - Creating Arduino programming environment – Using the Arduino IDE – Creating the Arduino Program – Working with variables - Structured Commands – Programming loops – Working with strings – Implementing data structures – Creating functions – Storing data – Using Libraries – Working with digital interfaces – Interfacing with analog devices – Communicating with devices.

### UNIT V CASE STUDY (9)

Data compressor - Alarm Clock - Audio player - Software modem-Digital still camera - Telephone answering machine-Engine control unit – Video accelerator.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. Marilyn Wolf, "Computers as Components - Principles of Embedded Computing System Design", 3<sup>rd</sup> ed., "Morgan Kaufmann Publisher (An imprint from Elsevier), 2012. (UNIT I,II,III,V)
2. Richard Blum, "Arduino Programming in 24 hours" Pearson Education 2015. (UNIT IV).

**REFERENCES:**

1. Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", 2<sup>nd</sup> ed., Cengage Learning, 2012.
2. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x		x							x
2	x	x	x		x							x
3	x	x	x		x							x
4	x	x	x	x	x	x	x	x	x		x	x
5	x	x	x	x	x	x	x	x	x		x	x



## 15CSX19 IMAGE PROCESSING TECHNIQUES

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To learn digital image fundamentals.
- To get exposed to simple image processing techniques.
- To become familiar with image compression and segmentation techniques
- To learn to represent image in form of features.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Discuss digital image fundamentals.
- CO2 Apply image enhancement techniques.
- CO3 Efficiently use image restoration techniques.
- CO4 Use image compression and segmentation Techniques.
- CO5 Represent features of images.

### 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 .

### 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

### UNIT IV WAVELETS AND IMAGE COMPRESSION

(9)

Wavelets – Subband coding – Multiresolution 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.

### UNIT V IMAGE REPRESENTATION AND RECOGNITION

(9)

Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", 3<sup>rd</sup> ed., Pearson Education, 2010.

### REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", 3<sup>rd</sup> ed., Tata McGraw Hill Pvt. Ltd., 2011.
2. Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011.
3. William K Pratt, "Digital Image Processing", John Wiley, 2002.
4. Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", 1<sup>st</sup> ed., PHI Learning Pvt. Ltd., 2011.

### Mapping of Course Outcome and Programme Outcome

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x										
2	x			x								
3			x			x			x			
4	x		x			x					x	
5		x	x	x	x				x		x	



## 15CSX20 ARTIFICIAL INTELLIGENCE

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To illustrate the basic concepts of logic and knowledge-based agents.
- To build the most basic concepts, representations and algorithms for planning, to explain the method of achieving goals.
- To introduce the most basic concepts, representations and algorithms for planning, to explain the method of achieving goals.
- To understand the concept of uncertainty and to learn the syntax and semantics of probability theory.
- To understand the basic concepts of several learning techniques.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Understand the fundamentals of knowledge representation of agents.
- CO2 An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
- CO3 Understand the representation of states, algorithm for planning and real world problems.
- CO4 Analysis and compare the different learning process and apply to the probability theory.
- CO5 Understand the different limitations of current Artificial Intelligence techniques.

### UNIT I INTRODUCTION (9)

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

### UNIT II KNOWLEDGE AND LOGICAL REASONING (9)

Knowledge Based Agents – Logical Agents – Propositional Logic – Inferences – First-order Logic – Inferences in First order Logic – Forward Chaining – Backward Chaining – Unification and Lifting – Resolution

### UNIT III PLANNING STRATEGIES (9)

Introduction – Planning problem – Planning with State Space Search – Partial order Planning – Planning Graphs – Plan graph for Heuristic Estimation – Plan Graph Algorithm – Planning with propositional logic – Planning and Acting in the real world – Time, Schedules, and Resources.

### UNIT IV UNCERTAIN KNOWLEDGE AND REASONING (9)

Uncertainty – Review of Probability - Probabilistic Reasoning – Bayesian Networks – Inferences in Bayesian Networks – Inference by Enumeration – Variable Elimination Algorithm – Temporal Models – Hidden Markov Models.

### UNIT V LEARNING TECHNIQUES (9)

Learning from Observation –Forms of Learning – Ensemble Learning – Computational Learning Theory – Inductive Learning – Decision Trees – Decision Trees as Performance Elements – Expressiveness of Decision Tree – Explanation Based Learning – Statistical learning Methods –Reinforcement Learning

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", 3<sup>rd</sup> ed., Pearson Education, 2010.

**REFERENCES:**

1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", 4<sup>th</sup> ed., Pearson Education, 2002.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x		x			x	
2	x	x	x	x					x		x	
3	x	x	x	x					x		x	
4	x	x	x	x					x		x	
5	x		x	x		x			x		x	



## 15ITC01 - INTERNET OF THINGS

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To learn the basic issues, policy and challenges in the Internet
- To understand the components and the protocols in Internet
- To build a small low cost embedded system with the internet
- To understand the various modes of communications with Internet.
- To learn to manage the resources in the Internet.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Identify the components of IOT
- CO2 Design a portable IOT using appropriate boards
- CO3 Program the sensors and controller as part of IOT
- CO4 Develop schemes for the applications of IOT in real time scenarios
- CO5 Establish the communication to the cloud through Wi-Fi / Bluetooth

### UNIT I IOT NETWORK TECHNOLOGY

(9)

Introduction - Examples of IoT in Use Today - Basic Internet Concepts - Choice of Connectivity - ICANN and IP Addresses - Cellular Connectivity - Types of Cellular Technologies - Cellular Fall-Back - Determining Location.

### UNIT II SENSOR, SCHEDULING AND PROCESSING

(9)

IOT Sensors - Typical IoT/M2M Sensors - Conversion to Digital Data - Calibration and Linearization - Data Transmission Schedules - UDP or TCP - Content Encoding - Gateways - Application Servers - Cloud Computing - Fog Computing.

### UNIT III SECURITY AND SCALABILITY

(9)

Privacy and Security - Security Objectives - Security Issues for IoT/M2M - Risk Management and Assessing Impact of Breaches - Encryption as an IoT Tool - Choice of Encryption Algorithm - Scalability - End-of-Life Management - Scalability and Connectivity.

### UNIT IV CONNECTIVITY MANAGEMENT PLATFORMS AND ANALYTICS

(9)

Connectivity Management Platform - The Difficulties of Managing IoT Connectivity - Essential Connectivity Management Platform Features - IoT Data and Analytics - Types of Analytics - Analytics Tools and Languages

### UNIT V IMPLEMENTING AN IOT SOLUTION AND LIFECYCLE MANAGEMENT

(9)

Supply Chain Management - Cellular Operator Selection - Operator Support Service Level Agreement - Device Certification - Normal Operation Considerations - Application Communications Call Flow - Customer Support Process - LifeCycle Management - Planning Checklist - Lifecycle Management Phases - Pitfalls to Avoid - Future of IOT

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Syed Zaeem Hosain , The Definitive guide, "The Internet of Things for Business", 2<sup>nd</sup> ed., Aeris, August 2016
2. Cuno Pfister, "Getting Started with the Internet of Things", O'Reilly, 1<sup>st</sup> ed., May 2011

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x								x			x
2	x	x	x								x	x
3	x	x		x		x			x			x
4	x	x	x	x	x				x		x	x
5	x	x	x	x	x				x		x	x



## 15CSX22 MACHINE LEARNING TECHNIQUES

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability based learning techniques
- To understand graphical models of machine learning algorithms

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Distinguish between, supervised, unsupervised and semi-supervised learning
- CO2 Apply the apt machine learning strategy for any given problem
- CO3 Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
- CO4 Design systems that uses the appropriate graph models of machine learning
- CO5 Modify existing machine learning algorithms to improve classification efficiency

### UNIT I: INTRODUCTION

(9)

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

### UNIT II: LINEAR MODELS

(9)

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.

### UNIT III: TREE AND PROBABILISTIC MODELS

(9)

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

### UNIT IV: DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS

(9)

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

### UNIT V: GRAPHICAL MODELS

(9)

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. Stephen Marsland, —Machine Learning – An algorithmic perspective, 2<sup>nd</sup> ed., Chapman and Hall/CRC Machine learning and Pattern Recognition Series, 2014.
2. Tom M Mitchell, —Machine Learning, 1<sup>st</sup> ed., McGraw Hill Education India Ltd, 2013.

**REFERENCE BOOKS:**

1. Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, 1<sup>st</sup> ed., Cambridge University Press, 2012.
2. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, 1<sup>st</sup> ed., Wiley, 2014
3. Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), 3<sup>rd</sup> ed., MIT Press, 2014

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x		x			x	
2	x	x	x	x					x		x	
3	x	x	x	x					x		x	
4	x	x	x	x					x		x	x
5	x		x	x		x			x		x	x



## 15CSX23 SOFTWARE DESIGN AND ARCHITECTURE

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand the fundamentals of software architecture.
- To perceive knowledge on software architecture process.
- To be familiar with architectural models for emerging technologies.
- To gain knowledge about software quality models.
- To learn the software design approaches and conformance.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Explain influence of key architectural structures on business and technical activities.
- CO2 Define software architecture process.
- CO3 Design software architecture model for large scale software systems.
- CO4 Design and understand various software quality models.
- CO5 Recognize major software architectural styles, design patterns, and frameworks.

### UNIT I FUNDAMENTALS OF ARCHITECTURE AND DESIGN (9)

Software Architecture – Elements, Stakeholders, and Architectural Descriptions – Architectural Views – Viewpoints – Viewpoint Pitfalls – Architectural Perspectives – Role of Software Architect – Design Concepts – Design Characteristics – Design Elements – Design Factors.

### UNIT II PROCESS OF SOFTWARE ARCHITECTURE (9)

Introduction to Architecture – Architecture Definition Process – Guiding Principles - Process Outcomes – Process Context – Supporting Activities – Architecture Definition Activities – Process Exit Criteria – Architectural Scope – Architectural Scope and Concerns – Architectural Principles and Constraints – Identifying and Engaging Stakeholders – Identifying and Using Scenarios – Types of Scenarios – Uses for Scenarios – Identifying and Prioritizing Scenarios – Capturing Scenarios – Applying and Use of Scenarios – Software Styles, Patterns, and Idioms.

### UNIT III ARCHITECTURE MODELS AND DESCRIPTION (9)

Producing Architectural Models – Need for Models – Types of Models – Modeling Languages – Guidelines for Creating Effective Models – Agile Modeling Techniques – Creating Architectural Description – Properties of Effective Architectural Description – Glossaries – IEEE Standard – Contents of Architectural Description – Validating the Architecture– Validation Techniques – Scenario Based Evaluation Methods – Introduction to View Point Catalog – Functional View Point.

### UNIT IV DESIGN QUALITY (9)

Software Quality Models – Effect of Design on Software Quality – Quality Attributes of Software Design – Design Principles: Design Roles, Design Processes, and Design Methods – Notion of Software Architecture – Software Architecture Style – Description of Software Architectures: Visual Notation and Client-Server Pair.

### UNIT V APPROACHES, ARCHITECTURAL AND DESIGN STYLES (9)

Typical Architecture Styles – Data Flow – Independent Components – Call & Return – Data Centered and Virtual Machine – Design Styles – Choices of Styles – Combinations of Styles – Case Study on Keyword Frequency Vector – Architectural Design Space – Theory Of Design Spaces – Design Space of Architectural Elements – Design Space of Architectural Styles.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. Nick Rozanski, Eoin Woods, "Software Systems Architecture – Working with Stakeholders Using Viewpoints and Perspectives", Pearson Education, 2<sup>nd</sup> ed., 2012.
2. Hong Zhu, "Software Design Methodology – From Principles to Architectural Styles", Elsevier, 2005.

**REFERENCES:**

1. David Budgen, "Software Design", Pearson Education, 2003.
2. Len Bass, Paul Clements, Rick Kazman, "Software Architecture in Practice", Pearson Education, 2<sup>nd</sup> ed., 2012.
3. Eric J. Braude, "Software Design: From Programming to Architecture", John Wiley & Sons, 2004

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x							x	x		x	x
2	x							x	x		x	x
3	x		x	x	x			x	x		x	x
4	x		x	x	x			x	x		x	x
5	x		x	x	x			x	x		x	x



## 15CSX24 SOFTWARE TESTING METHODOLOGIES

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand the basics of software testing.
- To learn the various test design strategies.
- To understand the levels of testing.
- To learn the test plan and test management.
- To understand the software testing tools and testing reviews.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Summarize software testing principles and defects.
- CO2 Differentiate various test case design strategies.
- CO3 Outline different levels of testing.
- CO4 Develop a software test plan.
- CO5 Determine suitable testing tool for a particular application.

### UNIT I INTRODUCTION

(9)

Testing as an Engineering Activity – Role of Process in Software Quality – Testing as a Process – Basic Definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository.

### UNIT II TEST CASE DESIGN

(9)

Test Case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Equivalence Class Partitioning – Boundary Value Analysis – Cause and Effect Graphing – State Transition Testing – Error Guessing – Using White Box Approach to Test design – Test Adequacy Criteria – Coverage and Control Flow Graphs – Covering Code Logic – Paths: Their Role in White box Test Design – Static Vs Structural testing – Evaluating Test Adequacy Criteria.

### UNIT III TYPES 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 – System Testing – Types of system testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad hoc testing.

### UNIT IV TEST PLAN AND 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 – The role of three groups in Test Planning and Policy Development – Introducing the Test Specialist – Skills needed by a Test Specialist – Building a Testing Group.

### UNIT V TOOLS AND MONITORING

(9)

Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements and Selecting a test tool – Challenges in Automation – Status Meetings, Reports and Control Issues – Criteria for Test Completion – Types of reviews – Components of Review Plans – Reporting Review Results – Test Metrics and Measurements – Case study: Using Java JUnit.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. Ilene Burnstein, "Practical Software testing- A Process-Oriented Approach", Springer, 2009.
2. Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing–Principles and Practices", Pearson education, 2006.

**REFERENCES:**

1. Aditya P.Mathur, "Foundations of Software Testing", Pearson Education, 2008.
2. Boris Beizer, "Software Testing Techniques", 2<sup>nd</sup> ed., Dreamtech, 2003
3. Elfriede Dustin, "Effective Software Testing", 1<sup>st</sup> ed., Pearson Education, 2003.
4. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004.
5. <https://dzone.com/articles/junit-tutorial-beginners>

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x						x		x	x
2	x	x	x	x					x		x	x
3	x	x	x	x			x		x		x	x
4	x	x	x	x			x		x	x	x	x
5	x	x		x	x				x	x	x	x



## 15CSX25 SOFTWARE AGENTS

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand the software agents that reduces information overhead.
- To gain knowledge in use of software agents for cooperative learning and personal assistance.
- To know how agent can communicate and share knowledge using agent communication language.
- To gain knowledge in design of an agent interpreter and intelligent agent.
- To understand the concept of mobile technology and mobile agents and its security.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Define the characteristics of an intelligent agent.
- CO2 Identify agents for learning and assistance.
- CO3 Describe the communication and collaboration among agents.
- CO4 Understand Agent architectures.
- CO5 Use Agent Development Environment to develop the project.

### UNIT - I AGENT AND USER EXPERIENCE

(9)

Agent Characteristics – Agent Types – Interacting with Agents – Agent from Direct Manipulation to Delegation – Interface Agent, Metaphor with Character – Designing Agents – Direct Manipulation versus Agent Path to Predictable.

### UNIT - II AGENTS FOR LEARNING AND ASSISTANCE

(9)

Agents for Information Sharing and Coordination – Agents that Reduce Work Information Overhead – Agents without Programming Language – Life like Computer Character – S/W Agents for Cooperative Learning – The M system.

### UNIT - III AGENT COMMUNICATION AND COLLABORATION

(9)

Overview of Agent Oriented Programming – Agent versus Object Oriented Programming – A Generic Agent Interpreter – Agent Communication Language – KQML – Applications – Agent Based Framework of Interoperability.

### UNIT - IV AGENT ARCHITECTURE

(9)

Agents for Information Gathering – Agent Organization – Knowledge of an Agent – Communication Language and Protocol – Query Processing – Open Agent Architecture – Communicative Action for Artificial Agent.

### UNIT - V MOBILE AGENTS

(9)

Mobile Agent Paradigm – Mobile Agent Concepts – Mobile Agent Technology – Programming Mobile Agents – Application of Mobile Agents – Teleshopping – Mobile Agent Security – Trust, Reliability and Reputation.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Jeffrey M. Bradshaw, "Software Agents", PHI Learning Private Limited, 2010.

### REFERENCES:

1. Lin, Fuhua Oscar (Ed.), "Designing Distributed Learning Environments with Intelligent Software Agents", Information Science Publishing, 2004.
2. Knapik, Michael and Jay Johnson "Developing Intelligent Agents for Distributed Systems: Exploring Architecture, Technologies, and Applications", McGraw-Hill, 1998.
3. William R. Cockayne, Michael Zyda, "Mobile Agents", Prentice Hall, 1998.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x									x	
2	x	x		x	x							
3			x	x							x	
4	x		x									
5	x	x		x							x	



## 15CSX26 SOFTWARE QUALITY ASSURANCE

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### OBJECTIVE:

- To know the role and planning of quality assurance.
- To study the importance of standards in the quality management process.
- To understand the software metrics for software quality and maintenance.
- To illustrate the software quality program concepts.
- To learn about software quality assurance standards.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Understand the quality and configuration management processes.
- CO2 Manage the quality of software by applying standards.
- CO3 Analyze the software metrics and apply the quality tools in software development.
- CO4 Demonstrate the various activities of quality planning and quality control.
- CO5 Compare the ISO 9000 Model with SEI's CMM Level 5.

### UNIT I FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE (9)

The Role of SQA – SQA Plan – SQA considerations – SQA people – Quality Management – Software Configuration Management.

### UNIT II MANAGING SOFTWARE QUALITY (9)

Managing Software Organizations – Managing Software Quality – Defect Prevention – Software Quality Assurance Management – IT Infrastructure Library.

### UNIT III SOFTWARE QUALITY ASSURANCE METRICS (9)

Software Quality – Total Quality Management (TQM) – Quality Metrics – Software Quality Metrics: Product, In-Process – Metrics for Software Maintenance – Defect Removal Effectiveness – Applying the Seven Basic Quality Tools in Software Development.

### UNIT IV SOFTWARE QUALITY PROGRAM (9)

Software Quality Program Concepts – Establishment of a Software Quality Program – Software Quality Assurance Planning – An Overview – Purpose and Scope.

### UNIT V SOFTWARE QUALITY ASSURANCE STANDARDIZATION (9)

Software Standards – ISO 9000 Quality System Standards – Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEI's CMM.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOKS:

1. Watts S Humphrey, "Managing the Software Process", Fifth Indian Impression, Pearson Education, 2008.
2. Stephen H. Khan, "Metrics and Models in Software Quality Engineering", Pearson Education, 2<sup>nd</sup> ed., 2003.
3. Mordechai Ben-Menachem / Garry S Marliss, "Software Quality", BS Publications, Hyderabad, 2014.

### REFERENCES:

1. Gordon G Schulmeyer, "Handbook of Software Quality Assurance", 4<sup>th</sup> ed., Artech House Publishers, 2008
2. Nina S Godbole, "Software Quality Assurance: Principles and Practice", Alpha Science International Ltd, 2004.
3. Ian Sommerville, "Software Engineering", 10<sup>th</sup> ed., Pearson Education, 2015.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x							x		x	x
2	x	x			x				x		x	x
3	x	x		x	x		x	x	x		x	x
4	x	x		x	x		x	x	x		x	x
5	x		x		x			x	x		x	



## 15CSX27 SOFTWARE ENGINEERING PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To recognize software project planning.
- To learn the cost estimation techniques during the analysis of the project.
- To differentiate the quality concepts for ensuring the functionality and estimation of the software.
- To understand the risk management techniques and resource allocation process.
- To manage the people behavioral aspects in the organization.

### COURSE OUTCOMES:

At the end of the course, the students will be able to

- CO1 Evaluate the activities carried out during the project scheduling.
- CO2 Acquire knowledge to create reliable cost estimation.
- CO3 Apply the software effort estimation and recent quality standards for evaluation of the software projects.
- CO4 Determine the risk management activities and the resource allocation.
- CO5 Obtain character based project learning.

### UNIT I SOFTWARE PROJECT MANAGEMENT CONCEPTS (9)

Introduction to Software Project Management – An Overview of Project Planning: Select Project – Identifying Project Scope and Objectives – Infrastructure – Project Products and activities – Estimate Efforts for Activity – Identify Activity Risks and Allocate Resources.

### UNIT II SOFTWARE EVALUATION AND COSTING (9)

Project Evaluation: Strategic Assessment – Technical Assessment – Cost-Benefit Analysis – Cash Flow Forecasting – Cost-Benefit Evaluation Techniques – Risk Evaluation – Selection of an Appropriate Project Approach: Choosing Technologies – Software Processes and Process Models – Choice of Process Models – Structured Versus Speed of Delivery.

### UNIT III SOFTWARE ESTIMATION TECHNIQUES & ACTIVITY PLANNING (9)

Software Effort Estimation: Problems With Over and Under Estimates – Basis for Software Estimation – Software Effort Estimation Techniques – Expert Judgment – Estimation by Analogy – Activity Planning: Project Schedules – Projects and Activities – Sequencing and Scheduling Activities – Networks Planning Models – Formulating a Network Model.

### UNIT IV RISK MANAGEMENT (9)

Risk Management: Introduction – Categories of Risk – A Framework for Dealing With Risk – Risk Identification – Assessment – Planning – Management – Evaluating Risk to Schedule – Resource Allocation: Scheduling Resources – Creating Critical Paths – Cost Schedules – Monitoring and Control: Creating the Framework – Cost Monitoring – Prioritizing Monitoring.

### UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS (9)

Introduction – Understanding Behavior – Organizational Behavior – Selecting The Right Person for the Job – Instruction In The Best Methods – Motivation – The Oldham – Hackman Job Characteristics Model – Stress – Health and Safety – Working in Teams – Becoming a Team – Decision Making – Organizational Structures – Leadership – Case Studies.

**TOTAL (L:45) = 45 PERIODS**

### TEXT BOOK:

1. Bob Hughes, Mike cotterell, "Software Project Management", 5<sup>th</sup> ed., Tata McGraw Hill, 2011.

### REFERENCES:

1. S.A. Kelkar, "Software Project Management", PHI, New Delhi, 3<sup>rd</sup> ed., 2013.
2. Richard H. Thayer, "Software Engineering Project Management", IEEE Computer Society.
3. Web reference: <http://www.mhhe.com/engcs/compsci/pressman/student/olc/cases.mhtml>

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x								x	x	
2	x	x		x	x					x		
3			x	x						x	x	
4	x							x		x		
5				x						x	x	



## 15GEC03 PROFESSIONAL ETHICS AND HUMAN VALUES

L	T	P	C
3	0	0	3

### OBJECTIVE:

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

### COURSE OUTCOMES:

At the end of the course, the student will be able to

- CO1 Understand the concepts of ethics and values.
- CO2 Acquire the knowledge of interpersonal and organizational issues in ethics
- CO3 Highlight the ethical issues related to engineering.
- CO4 Learn the concepts of engineer's responsibilities and their rights.
- CO5 Understand the role of global issues and professional bodies.

### 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.

### 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 – The Challenger case study – Bhopal Gas Tragedy and Chernobyl case studies.

### 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.

**TOTAL : ( L: 45 ) = 45 PERIODS**

### TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", 4<sup>th</sup> ed., Tata Mc Graw Hill, New Delhi, 2014.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India Private Limited, New Delhi, 20012.

### REFERENCES:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2008
4. <http://www.slideworld.org/slidestag.aspx/human-values-and- Professional-ethics>
5. [www.mne.psu.edu/lamancusa/ProdDiss/Misc/ethics.ppt](http://www.mne.psu.edu/lamancusa/ProdDiss/Misc/ethics.ppt).

## Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1						x		x				
2						x		x				
3						x		x	x			x
4						x		x	x			
5						x		x	x			x



## 15GEC04 TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To understand total quality management concepts and principles and the various tools available to achieve total quality management, statistical approach for quality control, ISO & QS certification process and its needs for the industries.

### COURSE OUTCOMES:

At the end of the course, the student will be able to

- CO1 Acquire various concepts of quality management.
- CO2 Implement various principles of quality management.
- CO3 Impart quality using statistical process.
- CO4 Use the various tools to maintain quality.
- CO5 Implement the quality system for ISO certification.

### UNIT I - INTRODUCTION

(9)

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

### UNIT II - TQM PRINCIPLES

(9)

Leadership - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal – Continuous process improvement – PDCA cycle, 5S, Kaizen – Supplier Partnership – Partnering, Supplier selection - Supplier Rating.

### UNIT III - TQM TOOLS AND TECHNIQUES- I

(9)

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

### UNIT IV - TQM TOOLS AND TECHNIQUES- II

(9)

Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

### UNIT V - QUALITY SYSTEMS

(9)

Need for ISO 9000 - ISO 9001:2008 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

**TOTAL : ( L: 45 ) = 45 PERIODS**

### TEXT BOOK:

- Dale H. Besterfield, et al., "Total quality Management", Pearson Education Asia, 3<sup>rd</sup> ed., Indian Reprint, 2011.

### REFERENCES:

- James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8<sup>th</sup> ed., First Indian Edition, Cengage Learning, 2012.
- Subburaj Ramasamy, "Total Quality Management", Tata McGrawHill, 1<sup>st</sup> reprint 2009.
- Suganthi. L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
- Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

## Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x			x						
2		x	x			x						
3		x	x		x							
4		x	x		x							
5		x	x			x		x				



## 15GEC01 PRINCIPLES OF MANAGEMENT

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To provide knowledge on planning, organizing, leading and controlling at different conditions in organizations.

### COURSE OUTCOMES:

At the end of the course, the student will be able to

- CO1 To acquire comprehensive knowledge on management concepts.
- CO2 To learn about the planning under different conditions and situations.
- CO3 To accomplish organizing of the human resources.
- CO4 To obtain employees motivation and project managements in working environments.
- CO5 To do the budgetary and non-budgetary control of projects.

### UNIT I OVERVIEW OF MANAGEMENT

(9)

Definition of management – Science & Art – Management & Administration - Role of managers – Evolution of Management thoughts – Contribution of Taylor and Fayol – Functions of management – Strategies for International business.

### UNIT II PLANNING

(9)

Nature and purpose of planning - Planning process - Types of plans – Objectives – Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions.

### UNIT III ORGANIZING

(9)

Nature and purpose of organizing - Organization structure - Formal and informal organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation -Career Development - Career stages – Training - Performance Appraisal.

### UNIT IV DIRECTING

(9)

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership – Types of Leadership –Job enrichment - Communication - hurdles to effective communication – Organization Culture - Elements and types of culture - Managing cultural diversity.

### UNIT V CONTROLLING

(9)

System and Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control – Quality Control - Planning operations.

**TOTAL :( L: 45 ) = 45 PERIODS**

### TEXT BOOK:

1. Harold Koontz, Heinz Weihrich , “Essentials of Management”, Tata McGrawHill, 8<sup>th</sup> ed., Second Reprint 2010.

### REFERENCES:

1. Andrew J. Dubrin, “Essentials of Management”, Thomson Southwestern, 9<sup>th</sup> ed., 2012.
2. Stephen P. Robbins and Mary Coulter, “Management”, Prentice Hall of India, 10<sup>th</sup> ed., 2010.
3. Charles W L Hill, Steven L Mc Shane, “Principles of Management”, Mc Graw Hill Education, Special Indian Edition, 2008.
4. Hellriegel, Slocum & Jackson, “Management - A Competency Based Approach”, Thomson South Western, 10<sup>th</sup> ed., 2007.
5. Harold Koontz, Heinz Weihrich and Mark V Cannice, “Management - A global & Entrepreneurial Perspective”, Tata Mc Graw Hill, 12<sup>th</sup> ed., 2007.

## Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1							x	x	x			
2			x	x			x		x			
3			x	x		x			x			
4				x		x				x	x	
5			x		x		x				x	



**15CEZ01 ENERGY CONSERVATION IN BUILDINGS**  
**(Common to All branches except Civil Engineering)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To get idea on energy estimates considering about climate zones.
- To gain knowledge on energy conservation in buildings and monitoring systems

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1: Get idea on climate effects on building systems.
- CO2: Perform energy estimation for buildings
- CO3: Implement thermal insulation techniques in buildings.
- CO4: Plan for the energy conservation methods in buildings.
- CO5: Apply monitoring and control of energy systems in buildings.

**UNIT I CLIMATE**

**(6)**

Climate and shelter – Historic buildings – Modern architecture – Examples from different climate zones.

**UNIT II ENERGY ESTIMATION**

**(9)**

Thermal comfort – Solar geometry and shading – Heating and cooling loads – Energy estimates and site planning – Integrative Modeling methods and building simulation

**UNIT III PRINCIPLES OF ENERGY**

**(9)**

Principles of Energy conscious building design – Energy conservation in buildings – Day lighting – Water heating and photovoltaic systems – Advances in thermal insulation – Heat gain / loss through building components – Solar architecture

**UNIT IV ENERGY CONSERVATION**

**(9)**

Passive solar heating – Direct gain – Thermal storage wall – Sunspace – Convective air loop – Passive cooling – Ventilation – Radiation – Evaporation and Dehumidification – Mass effect – Design guidelines

**UNIT V MONITORING AND CONTROL SYSTEMS**

**(12)**

Energy conservation in building – Air conditioning – HVAC equipment – Computer packages for thermal design of buildings and performance prediction – Monitoring and instrumentation of passive buildings – Control systems for energy efficient buildings – Illustrative passive buildings – Integration of emerging technologies – Intelligent building design principles.

**TOTAL: L: 45 = 45 PERIODS**

**TEXT BOOKS:**

1. J.K. Nayak and J.A. Prajapati Hadbook on Energy Consious Buildings, Solar Energy Control MNES, 2006.
2. J.A. Clarke, Energy Simulation in Building Design (2e) Butterworth 2001.

**REFERENCES:**

1. J.R. Williams, Passive Solar Heating, Ann Arbar Science, 1983.
2. R.W. Jones, J.D. Balcomb, C.E. Kosiewicz, G.S. Lazarus, R.D. McFarland and W.O. Wray, Passive Solar Design Hanbook, Vol.3, Report of U.S. Department of Energy (DOE/CS-0127/3), 1982.
3. M.S. Sodha, N.K., Bansal, P.K. Bansal, A.Kumar and M.A.S. Malik. Solar Passive Building, Science and Design, Pergamon Press, 1986.
4. J.L. Threlkeld, Thermal Environmental Engineering, Prentice Hall, 1970.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x				x					
2	x	x	x				x					x
3	x		x		x		x					x
4	x		x				x		x			x
5		x		x			x				X	

*Dr. Le. N. S. S. S.*

**15CEZ02 WASTE MANAGEMENT**  
**(Common to All branches except Civil Engineering)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To understand of the basic principles of waste and resource management will be supplemented, where appropriate, by practical problem-solving exercises.
- To provide detailed knowledge and skills in the management, treatment, disposal and recycling options for solid wastes.
- To provide details on resource efficiency plays in conserving resources and contributing to a low carbon economy.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

CO1: Understand and apply the basic for solving practical waste management challenges.

CO2: Understand the collection of waste and recycling.

CO3: Understand the fundamental principles of existing and emerging technologies for the treatment of waste.

CO4: Appreciate the role of decision-making tools in the critical assessment of major waste issues.

CO5: Understand the economy and financial aspects of waste management.

**UNIT I INTRODUCTION & TYPES OF SOURCES (9)**

Problems and need of solid and hazardous waste management - Waste management planning - Toxicology and risk assessment - Legislations on management and handling of different types of wastes.

**UNIT II WASTE GENERATION RATES (9)**

Composition - Hazardous Characteristics – TCLP tests – waste sampling- reduction of wastes at source – Recycling and reuse. Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations -labeling and handling of hazardous wastes.

**UNIT III WASTE PROCESSING (9)**

Processing technologies – biological and chemical conversion technologies – Composting - thermal conversion technologies - energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes.

**UNIT IV DISPOSAL (9)**

Site selection - design and operation of sanitary landfills - secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – landfill remediation

**UNIT V ECONOMY AND FINANCIAL ASPECTS (9)**

Elements of integrated waste management - Economy and financial aspects of waste management. Other Waste Types: Nuclear and Radio Active Wastes.

**TOTAL: L: 45 = 45 PERIODS**

**TEXT BOOKS:**

1. Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New York, 1993.

**REFERENCES:**

1. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000
2. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.
3. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.
4. Charles A. Wentz, Hazardous Waste Management, Second Edition, Pub: McGraw Hill International Edition, New York, 1995.

## Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x	x		x		x					
2			x		x		x					
3				x	x							x
4		x	x				x					
5			X		x				x		x	x

*Dr. M. S. Ravi*

Approved by Seventh Academic Council

**15CEZ03 AIR POLLUTION MANAGEMENT**  
**(Common to All branches except Civil Engineering)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To study about the characteristics and effects of air and noise pollution and the methods of controlling the same.
- To know about source inventory and control mechanism.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1: Understand about nature and characteristics of air pollutants.
- CO2: Identify the basic elements of atmosphere and its stability.
- CO3: Design stacks and particulate air pollution control devices to meet applicable standards.
- CO4: Understand the basic concepts of air quality management.
- CO5: Identify, formulate and solve air and noise pollution problems.

**UNIT I SOURCES AND EFFECTS OF AIR POLLUTANTS (9)**

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

**UNIT II DISPERSION OF POLLUTANTS (9)**

Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

**UNIT III AIR POLLUTION CONTROL (12)**

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

**UNIT IV AIR QUALITY MANAGEMENT (8)**

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality.

**UNIT V NOISE POLLUTION (7)**

Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention.

**TOTAL: L: 45 = 45 PERIODS**

**TEXT BOOKS:**

1. Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata McGraw Hill, New Delhi, 1996.

**REFERENCES:**

1. Heumann. W.L., "Industrial Air Pollution Control Systems", McGraw Hill, New York, 1997.
2. Mahajan S.P., "Pollution Control in Process Industries", Tata McGraw Hill Publishing Company, New Delhi, 1991.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. "Environmental Engineering", McGraw Hill, New Delhi, 1985.
4. Garg, S.K., "Environmental Engineering Vol. II", Khanna Publishers, New Delhi, 1998
5. Mahajan, S.P., "Pollution Control in Process Industries", Tata McGraw Hill, New Delhi, 1991.
6. Thod Godesh, "Air Quality, Lewis India Edition, 2013.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x					x					
2			x		x		x					x
3	x	x	x		x		x				x	x
4			x				x				X	
5		x	x		x						X	x

*Dr. Le. N. S. S. S. S.*

**15CEZ04 BUILDING SERVICES**  
**(Common to All branches except Civil Engineering)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To understand about electrical systems in building and its specifications.
- To know about the concepts of refrigeration and other safety installations as per NBC
- Planning and scheduling the frequency of inspection and maintenance of building including drainage

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1: Know about the basic electrical systems in buildings
- CO2: Gain knowledge about the modern lighting systems.
- CO3: Study about the HVAC systems.
- CO4: Be familiar with the concept of planning considerations and fire safety installation in buildings.
- CO5: Study about the concepts of plumbing and drainage in building.

**UNIT I ELECTRICAL SYSTEMS IN BUILDINGS (9)**

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

**UNIT II PRINCIPLES OF ILLUMINATION & DESIGN (9)**

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lamps of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

**UNIT III REFRIGERATION PRINCIPLES & APPLICATIONS (9)**

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Sub cooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

**UNIT IV FIRE SAFETY INSTALLATION (9)**

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers.

**UNIT V PLUMBING AND DRAINAGE (9)**

Plumbing fixtures and fixture fittings – Water conserving fittings – Over flows – Strainers and connectors – Prohibited fixtures – Special fixtures – Installation of water closet – Urinals - Flushing devices – Floor drains – Shower stall – Bath tub – Bidets – Minimum plumbing facilities – Rain water harvesting systems – Necessity – Construction – Different types .

**TOTAL: L: 45 = 45 PERIODS**

**TEXT BOOKS:**

1. Udayakumar, "A Text Book on Building Services", Eswar Press, 2007.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.

**REFERENCES:**

1. E.R.Ambrose, "Heat Pumps and Electric Heating", John and Wiley and Sons, Inc., New York, 1968.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.
3. R.G.Hopkinson and J.D.Kay, "The Lighting of buildings", Faber and Faber, London, 1969.
4. William H.Seaverns and Julian R.Fellows, "Air-conditioning and Refrigeration", John Wiley and Sons, London, 1988.
5. A.F.C. Sherratt, "Air-conditioning and Energy Conservation", the Architectural Press, London, 1980.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and Pos												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1		x	x				x					
2			x				x					
3			x				x					x
4		x	x		x				x			
5		x	x		x		x					x



**15CSZ01 SOFTWARE ENGINEERING METHODOLOGIES**  
(Common to All branches except CSE Branch)

L	T	P	C
3	0	0	3

**OBJECTIVE:**

- To Understand the life cycle models of software process
- To Understand fundamental concepts of requirements engineering .
- To learn the systematic procedure for software design
- To Implement the strategies for software testing
- To explore the significance of project planning and management.

**COURSE OUTCOMES:**

At the end of the course, the student should be able to:

- CO1: Identify the key activities in managing a software project.
- CO2: Compare different process models.
- CO3: Implement the Concepts of requirements engineering.
- CO4: Apply systematic procedure for software design and deployment.
- CO5: Compare and contrast the various testing and maintenance.

**UNIT I: SOFTWARE PROCESS**

(9)

Introduction –Software Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering – computer based system – verification – validation.

**UNIT II: SOFTWARE REQUIREMENTS**

(9)

Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -Software document. Analysis and modeling – data, functional and behavioral models – structured analysis and 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: SOFTWARE TESTING**

(9)

Taxonomy of software testing – levels – test activities – types of software test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large - software testing strategies - testing using extreme programming.

**UNIT V: SOFTWARE PROJECT MANAGEMENT**

(9)

Estimation – FP Based, LOC Based, Make/Buy Decision, COCOMO II - Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection, RMMM - Scheduling and Tracking –Relationship between people and effort, Task Set & Network, Scheduling, EVA – Process and Project Metrics

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOK:**

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", 7<sup>th</sup> ed., Mc Graw-Hill International Edition, 2010.

**REFERENCES :**

1. Ian Sommerville, "Software Engineering", 9<sup>th</sup> ed., Pearson Education Asia, 2011.
2. Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI COURSE Private Limited, 2009.
3. Pankaj Jalote, "Software Engineering - A Precise Approach", Wiley India, 2010.
4. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.
5. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company.

## Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x	x					x		
2		x	x		x							x
3	x	x	x	x	x				x	x		x
4	x		x	x								x
5	x	x		x	x						x	x



**15CSZ02 DESIGN THINKING**  
*(Common to All branches except CSE Branch)*

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To acquire Design Thinking skills.
- To learn by doing projects.
- To solve so called “wicked problems” (problems for which neither question nor answer is well defined).

**COURSE OUTCOMES:**

At the end of the course, the student will be able to

CO1: Have a sense of self-efficacy & creative confidence

CO2: Interpret and visualize the scenario..

CO3: Know how to manage a Design Thinking workshop Layout, roles, times and process.

CO4: Apply Design thinking tools to increase research output.

CO5: Do experiments by creating prototype and by obtaining feedback.

**UNIT I INTRODUCTION TO DESIGN THINKING**

**(9)**

Overview - Use of Design Thinking – Design Process. Getting Started: Define Challenges – Create a Project Plan. Design Thinking Tools.

**UNIT II DISCOVERY**

**(9)**

Understand the Challenge: Review the Challenge - Build your Team - Refine your Plan. Prepare Research: Identify Sources of Inspiration - Select Research Participants - Prepare For Fieldwork. Gather Inspiration: Immerse Yourself in Context - Seek Inspiration In Analogous Settings - Learn From Experts - Learn From Users.

**UNIT III INTERPRETATION**

**(9)**

Tell Stories: Capture Your COURSEs- Share Inspiring Stories. Search for meaning: Find Themes - Make Sense of Findings - Define Insights. Frame Opportunities: Create a Visual Reminder - Make Insights Actionable.

**UNIT IV IDEATION**

**(9)**

Generate Ideas: Prepare for Brainstorming - Facilitate Brainstorming - Select Promising Ideas - Sketch to Think. Refine Ideas - Do a Reality Check - Describe Your Idea.

**UNIT V EXPERIMENTATION AND EVOLUTION**

**(9)**

Make Prototypes: Create a Prototype. Get Feedback: Identify Sources for Feedback - Select Feedback Participants - Facilitate Feedback Conversations - Capture Feedback COURSEs - Integrate Feedback. Track COURSEs: Define Success - Document Progress. Move Forward: Plan Next.

**TOTAL :( L: 45 ) = 45 PERIODS**

**REFERENCES:**

1. <http://www.designthinkingforeducators.com/toolkit>
2. <https://hbr.org/2008/06/design-thinking>
3. <http://asimetica.org/wp-content/uploads/2014/06/design-thinking.pdf>

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x				x	x		x		
2					x							x
3	x			x	x		x	x				x
4	x		x									x
5	x	x		x	x	x	x		x	x		



**13CSZ03 OPEN SOURCE SOFTWARE**  
(Common to All branches except CSE Branch)

L	T	P	C
3	0	0	3

**OBJECTIVE:**

- To understand the basics of open source operating systems.
- To gain the knowledge of working with Linux platform and open source database.
- To be familiar with programming languages PHP, Perl, Python.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to

- C01: Install and run open-source operating systems.  
C02: Gather information about Free and Open Source Software projects from software releases and from sites on the internet.  
C03: Develop programs using PHP.  
C04: Solve problems using Python programming.  
C05: Develop programs using Perl.

**UNIT I: INTRODUCTION**

(9)

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources –Application of pen Sources. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode – Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals –Development with Linux.

**UNIT II: OPEN SOURCE DATABASE**

(9)

MySQL: Introduction – Setting up account –Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings –Date and Time – Sorting Query Results – Generating Summary – Working with metadata – Using sequences –MySQL and Web.

**UNIT III: OPEN SOURCE PROGRAMMING LANGUAGES**

(9)

PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP –String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails –Debugging and error handling – Security –Templates.

**UNIT IV: PYTHON**

(9)

Syntax and Style – Python Objects – Numbers – Sequences – Strings –Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output –Errors and Exceptions – Functions – Modules – Classes and OOP –Execution Environment.

**UNIT V: PERL**

(9)

Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines, Packages, and Modules- Working with Files –Data Manipulation.

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOKS:**

1. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003.
2. Steve Suchring, "MySQL Bible", John Wiley, 2002.

**REFERENCES:**

1. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
2. Wesley J. Chun, "Core Python Programming", Prentice Hall, 2001
3. Martin C. Brown, "Perl: The Complete Reference", 2<sup>nd</sup> Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
4. Steven Holzner, "PHP: The Complete Reference", 2<sup>nd</sup> Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x						x	x		x
2	x	x	x		x					x		x
3	x	x	x	x	x							x
4	x		x	x			x			x	x	x
5	x	x		x	x		x			x	x	x



**15CSZ04 INFORMATION SECURITY**  
(Common to All branches except CSE branch)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

**COURSE OUTCOMES:**

At the end of the course, the student should be able to:

- CO1: Understand the basics of Information Security
- CO2: Know the legal, ethical and professional issues in Information Security
- CO3: Know the aspects of risk management
- CO4: Become aware of various standards in this area
- CO5: Know the technological aspects of Information Security

**UNIT I: INTRODUCTION**

(9)

History, What is Information Security?, 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.

**UNIT III: SECURITY ANALYSIS**

(9)

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

**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 DESIGN**

(9)

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

**TOTAL (L:45) = 45 PERIODS**

**TEXT BOOK:**

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2017.

**REFERENCES:**

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw Hill, 2003
3. Matt Bishop, "Computer Security Art and Science", Pearson/PHI, 2002.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x				x		x		x
2		x	x	x	x							x
3	x			x	x			x	x	x		x
4	x		x	x				x				x
5	x	x	x	x	x			x	x	x		x



**15ECZ01 - AVIONICS**  
**(Common to All Branches except ECE branch)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To understand the needs for avionics for both Civil and military aircraft.
- To introduce various digital electronic principles and working operations of digital circuit.
- To integrate the digital electronics with cockpit equipments.
- To understand the various principles in flight disk and cockpit panels.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 : Describe the hardware required for aircraft.  
CO2 : Interfacing with analog and digital systems.  
CO3 : Design avionics system architecture.  
CO4 : Describe Civil and Military Cockpits.  
CO5 : Design of flight control systems and Radar systems.

**UNIT- I INTRODUCTION TO AVIONICS**

**(9)**

Need for Avionics in civil and military aircraft and space systems – Integrated Avionics system – Typical avionics sub systems – Design approaches and recent advances - Application Technologies.

**UNIT- II PRINCIPLES OF DIGITAL SYSTEMS**

**(9)**

Digital Computers – Digital number system- number systems and codes-Fundamentals of logic and combinational logic circuits –Digital arithmetic – interfacing with analogue systems - Microprocessors – Memories.

**UNIT- III DIGITAL AVIONICS ARCHITECTURE**

**(9)**

Avionics system architecture– salient features and applications of Data buses MIL–STD 1553 B–ARINC 429–ARINC 629.

**UNIT- IV FLIGHT DECK AND COCKPITS**

**(9)**

Control and display technologies CRT, LED, LCD, EL and plasma panel - Touch screen - Direct voice input (DVI) - Civil cockpit and military cockpit : MFDS, HUD, MFK, HOTAS 63.

**UNIT- V AVIONICS SYSTEMS**

**(9)**

Communication Systems - Navigation systems - Flight control systems - Radar electronic warfare - Utility systems Reliability and maintainability - Certification .

**TOTAL :( L: 45) =45 PERIODS**

**TEXT BOOKS:**

1. Middleton, D.H. "Avionics Systems", Longman Scientific and Technical, Longman Group UK.Ltd, England, 1989.
2. Spitzer, C.R. "Digital Avionics Systems", Prentice Hall, Englewood Cliffs, N.J., U.S.A., 1987.

**REFERENCES:**

1. Malcrno A.P. and Leach, D.P., "Digital Principles and Application", Tata McGraw-Hill, 1990.
2. Gaonkar, R.S., "Microprocessors Architecture – Programming and Application", Wiley and Sons Ltd., New Delhi, 1990.
3. Cary R .Spitzer, "The Avionics Handbook", CRC Press, 2000.
4. Brain Kendal, "Manual of Avionics", The English Book House, 3rd Edition, New Delhi, 1993.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									
2	x	x		x								x
3		x	x	x								x
4		x		x	x							x
5		x	x		x							x



**15ECZ02 - CONSUMER ELECTRONICS**  
**(Common to All Branches except ECE branch)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To study the basics of audio and video technology.
- To understand the electronic gadgets and telecommunication systems.
- To analyze and design consumer appliances.

**COURSE OUTCOMES:**

At the end of the course, the student will be able to

CO1 : Know the concepts of audio system.

CO2 : Know the concepts of video system.

CO3 : Analysis different techniques involved in audio and video processing.

CO4 : Identification of new developments in office equipment and domestic appliances.

CO5 : Know the working concepts of consumer applications.

**UNIT - I AUDIO SYSTEM COMPONENTS (9)**

Introduction to wave motion – Interference and superposition of waves – Beats, Resonance, Echos – characteristics of microphones – types of microphone – wireless microphones – Types of headphones – Loudspeakers

**UNIT-II AUDIO PROCESSING (9)**

Audio Filters, Types of AGC – Loudspeaker Impedance matching – Pre-emphasis and De-emphasis noise reduction – Optical recording and reproduction – stereophony, Quadraphony – Stereo controls –Equalizers –Mixer.

**UNIT - III VIDEO STANDARDS AND SYSTEMS (9)**

Elements of a TV system, scanning process – resolution, interlacing, composite signal The Kell factor. LED, LCD, Types of TV camera-Color TV systems- The NTSC system-The PAL systems- The SECAM system. Broadcasting of TV programs-Digital Video Recorder and CCTV Surveillance system

**UNIT - IV COMMUNICATION AND CONSUMER GADGETS (9)**

Radio system – VHF and UHF – Cellular communication - Types of mobile phones – Establishing cell-Smart card– Facsimile machine – electronic calculators – Digital clocks– Xerography - TV Remote.

**UNIT - V CONSUMER APPLICATIONS (9)**

Washing Machines – electronic controller, fuzzy logic, Hardware and Software development – Air Conditioners – Components, Remote Controls, Unitary and central air conditioner systems – Bar Coders – Bar codes, scanner and decoder – Set Top Box – Types, firmware development, Interactive program guides.

**TOTAL :( L: 45 )= 45 PERIODS**

**TEXT BOOK:**

1. S.P.Bali, Consumer Electronics, Pearson Education, 2005.

**REFERENCES:**

1. C.A. Schuler and W.L.Mc Namee, Modern Industrial Electronics, McGraw Hill, 2002.
2. D.J. Shanefield, Industrial Electronics for Engineers, Chemists and Technicians, Jaico Publishing House, 2007

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x			x		x		
3					x							x
4	x							x		x		
5	x		x		x			x		x		



**15ECZ03 - MODERN WIRELESS COMMUNICATION SYSTEMS**  
(Common to All Branches except ECE branch)

L	T	P	C
3	0	0	3

**OBJECTIVE:**

- To learn the comprehensive background concepts of wireless and mobile communication.
- To know the flavor of personal communication systems.
- To study the highlights of the latest communication networks and out the next generation networks.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 : Know the fundamentals of basic mobile communication wireless networks.
- CO2 : Have a detailed overview of different networking topologies and multiple access methods.
- CO3 : Have the information about the several generation of personal communication technologies
- CO4 : Know about the principles of operation of the different access technologies like FDMA, TDMA, SDMA and CDMA
- CO5 : Identify the different data services and short range networks used in mobile networks.

**UNIT- I TRANSMISSION FUNDAMENTALS**

(9)

Cellphone Generations: 1G, 2G, 2.5G, 3G & 4G Transmission Fundamentals: Time domain & Frequency domain concepts, Carrier-based signalling, spread-spectrum signalling.

**UNIT –II NETWORK CONCEPTS**

(9)

Communication Networks: LANs, MANs, WANs, circuit switching, packet switching, ATM Cellular Networks: Cells, duplexing, FDMA, TDMA, SDMA, CDMA, spectral efficiency.

**UNIT- III PERSONAL COMMUNICATION SERVICES**

(9)

GSM, HSCSD, GPRS, D-AMPS, CDMA One, CDMA Two, Packet Data Systems.

**UNIT- IV 3G & BEYOND**

(9)

IMT-2000, W-CDMA, CDMA 2000, EDGE, Wi-Fi, WiMAX, OFDM.

**UNIT- V MOBILE DATA SERVICES & SHORT-RANGE NETWORKS**

(9)

Mobile Data Services: Messaging, wireless web, WAP, site design Short-Range Wireless Networks: Unlicensed spectrum, Bluetooth, ZigBee, mobile OSs, smart phone applications.

**TOTAL : ( L: 45 )= 45 PERIODS**

**TEXT BOOKS:**

1. Andy Dornan, "The essential guide to wireless communications applications: from cellular systems to Wi-Fi", 2nd Edition, Prentice Hall, 2002.
2. Misra, "Wireless Communications and Networks: 3G & Beyond", Tata McGraw-Hill, 2013.

**REFERENCES:**

1. Theodore S. Rappaport, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2009.
2. William Stallings, "Wireless communications and networking", Prentice Hall, 2005

## Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									
2	x	x		x								x
3		x	x	x								x
4		x		x	x							x
5		x	x		x							x



**15ECZ04 - ELECTRONIC TESTING**  
**(Common to All Branches except ECE branch)**

L	T	P	C
3	0	0	3

**OBJECTIVE:**

- To understand the basics of testing and the testing equipments.
- To understand the different testing methods.
- To learn about testable system design.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 : Have knowledge of different types of faults and fault modeling.  
CO2 : Design the different testing schemes for Digital circuits.  
CO3 : Know the testing schemes for memories and mixed signal systems.  
CO4 : Have knowledge of various testability design schemes.  
CO5 : Diagnosis the Faults at module level.

**UNIT I - INTRODUCTION**

**(9)**

Test process and automatic test equipment, test economics and product quality, fault modeling.

**UNIT II - DIGITAL TESTING**

**(9)**

Logic and fault simulation, testability measures, combinational and sequential circuit test generation.

**UNIT III - ANALOG TESTING**

**(9)**

Memory Test, DSP Based Analog and Mixed Signal Test, Model based analog and mixed signal test, delay test, IDDQ test.

**UNIT IV - DESIGN FOR TESTABILITY**

**(9)**

Built-in self-test, Scan chain design, Random Logic BIST, Memory BIST, Boundary scan test standard, Analog test bus, Functional Microprocessor Test, Fault Dictionary, Diagnostic Tree, Testable System Design, Core Based Design and Test Wrapper Design, Test design for SOCs, Pre-Silicon to Post silicon test for FPGA.

**UNIT V - LOADED BOARD TESTING**

**(9)**

Unpowered short circuit tests, unpowered analog tests, Powered in-circuit analog, digital and mixed Signal tests, optical and X-ray inspection procedures, functional block level design of in-circuit test Equipment

**TOTAL :( L: 45) =45 PERIODS**

**TEXT BOOKS:**

1. Michael L. Bushnell and Vishwani D. Augural, "Essentials of Electronic Testing for Digital, Memory & Mixed-Signal VLSI Circuits", Springer, 2006.
2. Mehdi Dehbashi, Görschwin Fey "Debug Automation from Pre-Silicon to Post-Silicon" Springer, 25-Sep-2014.

**REFERENCE:**

1. Dimitris Gizopoulos, "Advances in Electronic Testing", Springer 2006.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x			x		x		
3					x							x
4	x							x		x		
5	x		x		x			x		x		

C.N.M.

*(Common to All Branches except EEE branch)***OBJECTIVE:**

- To emphasize the current energy status and role of renewable energy
- To know about the various concept of solar and wind energy
- To know about the various concept of biomass and other renewable energy sources

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

CO1: Plan appropriate kind of energy for the future development.

CO2: Know about solar energy concepts, techniques and its applications.

CO3: Identify the concepts, various wind turbines, storage and environmental aspects of wind energy.

CO4: Understand the concepts of biomass energy conversion technologies and plant design considerations.

CO5: Know some other renewable energy sources.

**UNIT I : INTRODUCTION****(9)**

World energy status, Current energy scenario in India, Environmental aspects of energy utilization, Environment-Economy - Energy and Sustainable Development, Energy planning. Reserves of Energy resources - Renewable energy resources - Potentials - Achievements - applications - Technical and social implications, issues in grid integration of power from renewable energy sources.

**UNIT II : SOLAR ENERGY****(9)**

Basic concepts, Solar radiation – Measurement, Solar thermal systems – Flat plate and concentrating collectors, Solar passive space – Solar heating and cooling techniques – Solar desalination – Solar Pond – Solar cooker – Solar dryers – Solar furnaces – Solar pumping – Solar green house- Solar thermal electric power plant – Solar photo voltaic conversion – Solar cells – PV applications – Hybrid systems.

**UNIT III : WIND ENERGY****(9)**

Introduction – Availability- Wind power plants, Power from the wind, Wind energy conversion systems, site characteristics – Wind turbines types – Horizontal and vertical axis – Design principles of wind turbine – Blade element theory - Magnus effect – Performance – Wind energy Applications – Hybrid systems – Wind energy storage – Safety and environmental aspects.

**UNIT IV : BIOMASS ENERGY****(9)**

Biomass – Usable forms- composition – Fuel properties – Applications – Biomass resource – Biomass conversion technologies – Direct combustion – Pyrolysis – Gasification – Anaerobic digestion –Bioethanol and Biodiesel Production – Economics – Recent developments – Energy farming – Biogas technology – Family biogas plants – Community and institutional biogas plants – design consideration – Applications

**UNIT V : OTHER RENEWABLE ENERGY SOURCES****(9)**

Tidal energy – Wave energy – Open and closed OTEC Cycles – Small hydro – Geothermal energy – Social and environmental aspects – Fuel cell technology: Types, principle of operation, applications –Hydrogen energy production – Storage – Transportation – Utilization.

**TOTAL: 45 PERIODS**


**TEXTBOOKS:**

1. Godfrey Boyle, "Renewable Energy", Power for a Sustainable Future, Oxford University Press, U.K, 1996.
2. Twidell.J.W & Weir.A, "Renewable Energy Sources", EFN Spon Ltd., UK, 1986.
3. Tiwari.G.N, "Solar Energy - Fundamentals Design", Modelling and applications, Narosa PublishingHouse, NewDelhi, 2002.

**REFERENCES:**

1. Kothari P, K C Singal and Rakesh Ranjan, "Renewable Energy Sources and Emerging Technologies", PHI Pvt. Ltd.,New Delhi, 2008.
2. G.D. Rai, "Non Conventional Energy Sources", Khanna Publishers, New Delhi, 1999.
3. S.P. Sukhatme, "Solar Energy", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x			x		x		
3					x							x
4	x							x		x		
5	x		x		x			x		x		



**OBJECTIVE:**

- To enable the students to acquire the knowledge of energy conservation measures in thermal and electrical energy systems.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1: Understand the concepts of energy status and conservation principle.  
CO2: Measure the energy conservation in steam systems  
CO3: Know about the energy conservation concepts of various fluid machineries  
CO4: Identify electrical energy conservation in various industries  
CO5: Know the energy management techniques and policies

**UNIT I ENERGY CONSERVATION PRINCIPLES (9)**

Energy scenario - Principles of energy conservation - Resource availability - Energy savings - Current energy consumption in India - Roles and responsibilities of energy managers in industries.

**UNIT II ENERGY CONSERVATION IN STEAM SYSTEMS (9)**

Power plant components - Conservation measures in steam systems, losses in boiler - Methodology of upgrading boiler performance - Blow down control, excess air control - Pressure reducing stations - Condensate recovery - Condensate pumping - Thermo compressor - Recovery of flash steam - Air removal and venting - Steam traps - Cooling towers.

**UNIT III ENERGY CONSERVATION IN FLUID MACHINERY (9)**

Centrifugal pumps - Energy consumption and energy saving potentials - Design consideration - Minimizing over design - Fans and blowers : specification, safety margin, choice of fans, controls and design considerations - Air compressor and compressed air systems: selection of compressed air layout, energy conservation aspects to be considered at design stage.

**UNIT IV ELECTRICAL ENERGY CONSERVATION (9)**

Potential areas for electrical energy conservation in various industries: conservation methods, energy management opportunities in electrical heating, lighting system, cable selection - Energy efficient motors - Factors involved in determination of motor efficiency - Adjustable AC drives - Variable speed drives - Energy efficiency in electrical system.

**UNIT V ENERGY AUDITING (9)**

Energy audit : need, preliminary audit, detailed audit, methodology and approach - Instruments for audit, monitoring energy and energy savings.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Reay.D.A, "Industrial energy conservation", Pergamon Press, 1<sup>st</sup> ed., 2003.
2. Albert Thumann, "Handbook of energy audits", 6<sup>th</sup> ed., The Fairmount Press, 2003.

**REFERENCES:**

1. Smith.C.B, "Energy Management Principles", Pergamon Press, 2006.
2. Hamies, "Energy Auditing and Conservation; Methods, Measurements, Management and Case study", Hemisphere, 2003.
3. Trivedi. P.R and Jolka .K.R, " Energy Management", Common Wealth Publication, 2002.

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x					x		
3												x
4	x											
5	x		x		x			x		x		



**OBJECTIVE:**

- To disseminate an overview of various electric machines used in industries, power generation and home appliances with a technical know-how on the control techniques

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1: Understand the constructional details and principle of operation of DC motors, induction machines, alternators, transformers and fractional horse-power motors
- CO2: Evaluate the performance of starting and operating characteristics of various electrical machines used in industrial and domestic applications
- CO3: Choose an appropriate method of speed control and braking for the drive motors
- CO4: Understand the concepts of synchronous motors
- CO5: Understand the manufacturing concepts in machines

**UNIT I : DC MOTORS**

**(9)**

Construction and working principle, emf equation, torque equation, starting and running characteristics, speed control, braking, duty of operation, choice of motors.

**UNIT II : TRANSFORMERS**

**(9)**

Construction and working principle, equivalent circuit, regulation and efficiency, autotransformers, industrial applications – welding transformer and furnace transformer.

**UNIT III : THREE PHASE INDUCTION MACHINES**

**(9)**

Construction and working principle. Induction motors - torque equation, torque-slip characteristics, starting and running characteristics, speed control, braking, choice of motor for industrial applications and traction.

**UNIT IV : SYNCHRONOUS MACHINES**

**(9)**

Construction, principle of operation and types, various types of excitation systems, stand alone and grid connected modes of operation, voltage and frequency control.

**UNIT V : FRACTIONAL HORSE POWER MACHINES**

**(9)**

Factory Automation: Flexible Manufacturing Systems concept – Automatic feeding lines, ASRS, transfer lines, automatic inspection – Computer Integrated Manufacture – CNC - Intelligent automation - Industrial networking, - Bus standards - HMI Systems - DCS and SCADA - Wireless controls.

**TOTAL: 45 PERIODS**

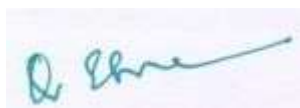
**TEXTBOOKS:**

1. D.P.Kothari and I.J.Nagrath, 'Electric Machines', McGraw Hill Education Private Limited, 4<sup>th</sup> ed, 2010.
2. Ashfaq Husain, 'Electric machines', Dhanpat Rai & Company, 2<sup>nd</sup> ed, 2002.

## REFERENCES:

1. Gopal K. Dubey, 'Fundamentals of Electrical Drives', Narosa publishing house, 2<sup>nd</sup> ed, 2011.
2. A Fitzgerald , Charles Kingsley , Stephen Umans, 'Electric Machinery', McGraw Hill Education Private Limited, 6th ed, 2002.
3. K. Muruges Kumar, 'Induction & Synchronous Machines', Vikas Publishing House Pvt Ltd., 2009.
4. Edward Hughes, 'Electrical and Electronic Technology', Dorling Kindersley (India) Pvt. Ltd., 10<sup>th</sup> ed, 2011.

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x	x	x					
3		x						x	x			
4		x			x	x		x	x			
5		x						x				



*(Common to All Branches except EEE branch)***OBJECTIVE:**

- To familiarize the students with basics of solar and wind energy systems and various techniques for the conversion of solar and wind energy into electrical energy.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1: Describe the solar radiation, measurements and characteristics of solar PV cell.  
 CO2: Develop the model of a PV system and its applications.  
 CO3: Describe the basic types and mechanical characteristics and model of wind turbine.  
 CO4: Analyze the electrical characteristics and operation of various wind-driven electrical generators.  
 CO5: Understand various power electronic converters used for hybrid system.

**UNIT I INTRODUCTION TO SOLAR****(9)**

Basic characteristics of sunlight – solar spectrum – insolation specifics– irradiance and irradiation pyranometer – solar energy statics- Solar PV cell – I-V characteristics –P-V characteristics– fill factor- Modeling of solar cell– maximum power point tracking.

**UNIT II PHOTO VOLATIC****(9)**

PV module – blocking diode and bypass diodes– composite characteristics of PV module – PV array– PV system –PV-powered fan–PV fan with battery backup – PV-powered pumping system – PV powered lighting systems–grid- connected PV systems.

**UNIT III WIND ENERGY****(9)**

Wind source–wind statistics–energy in the wind –turbine power characteristics - aerodynamics – rotor types – parts of wind turbines– braking systems–tower- control and monitoring system.

**UNIT IV GENERAL CHARACTERISTICS OF INDUCTION GENERATORS****(9)**

Grid-connected and self-excited systems – Steady state equivalent circuit - Performance predetermination – Permanent magnet alternators: steady-state performance.

**UNIT V HYBRID SYSTEMS****(9)**

Power electronic converters for interfacing wind electric generators – Power quality issues - Wind-diesel systems – Wind-solar systems.

**TOTAL = 45 PERIODS****TEXT BOOKS:**

- S N Bhadra, S Banerjee and D Kastha, 'Wind Electrical Systems', Oxford University Press, 1<sup>st</sup> Edition, 2005.
- Chetan Singh Solanki, 'Solar Photovoltaics: Fundamentals, Technologies and Applications' PHI Learning Publications, 2nd Edition, 2011.

**REFERENCES:**

1. Roger A. Messenger and Jerry Ventre, "Photovoltaic Systems Engineering", Taylor and Francis Group Publications, 2nd Edition, 2003.
2. M. Godoy Simoes and Felix A. Farret, "Alternative Energy Systems: Design and Analysis with Induction Generators", CRC Press, 2nd Edition, 2008.
3. Ion Boldea, 'The Electric Generators Handbook- Variable Speed Generators', CRC Press, 2010.
4. Bin Wu, Yongqiang Lang, Navid Zargari, Samir Kouro, "Power Conversion and Control of Wind Energy Systems", IEEE Press Series on Power Engineering, John Wiley & Sons, 2011.
5. S. Sumathi, L. Ashok Kumar, P. Surekha, 'Solar PV and Wind Energy Conversion Systems', Springer 2015.

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x					x			x
2		x			x			x		x		
3					x							x
4	x							x		x		
5	x		x		x			x		x		



**15EIZ01      AUTOTRONIX**  
**(Common to ALL Branches Except EIE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

This course focuses on the extent and nature of electronic circuitry in automotive systems including monitoring and control circuits for engines, emission control system, ignition systems and fuel systems. The course imparts applications of sensors on automotive systems .

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

CO1: Understand the application of electronics in automotive industry.

CO2: Identify different control systems in automotives and their control.

CO3: Design and implement various control algorithms in automotives.

CO4: Demonstrate different instrumentation systems in automotives.

CO5: Identify, formulate and solve real time engineering problems.

**UNIT I                      FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS                      (9)**

Electronic Engine Management System – Components – Open and Closed Loop Control Strategies – PID Control – Look Up Tables – Introduction – Modern Control Strategies Like Fuzzy Logic and Adaptive Control – Controlled Parameters – SI and CI Engines.

**UNIT II                      SENSORS AND ACTUATORS                      (9)**

Introduction – Basic Sensor Arrangement – Types Of Sensors – Hall Effect Sensor – Hot Wire Anemometer – Thermistor – Piezo-Electric Sensor – Piezo-Resistive Sensors – Oxygen Concentration Sensor – Lambda Sensor – Crankshaft Angular Position Sensor – Cam Position Sensor – Mass Air Flow (MAF) Rate – Manifold Absolute Pressure (MAP) – Throttle Plate Angular Position – Engine Oil Pressure Sensor – Vehicle Speed Sensor – Stepper Motors – Relays – Detonation Sensor – Emission Sensors.

**UNIT III                      SPARK IGNITION ENGINE MANAGEMENT                      (9)**

Feedback Carburetor System – Throttle Body Injection – Multi Point Fuel Injection System – Injection System Controls – Advantage of Electronic Ignition Systems – Three Way Catalytic Converter – Conversion Efficiency Versus Lambda – Group and Sequential Injection Techniques – Fuel System Components – Advantages of Electronic Ignition Systems – Solid State Ignition Systems – Principle Of Operation – Types – Contact Less Electronic Ignition System – Electronic Spark Timing Control.

**UNIT IV                      COMPRESSION IGNITION ENGINE MANAGEMENT                      (9)**

Fuel Injection System – Parameters Affecting Combustion – Noise and Emissions in CI Engines – Pilot, Main, Advanced – Post Injection and Retarded Post Injection – Electronically Controlled Unit Injection System – Layout of the Common Rail Fuel Injection System – Fuel Injector – Fuel Pump – Rail Pressure Limiter – Flow Limiter – Working Principle – EGR Valve Control in Electronically Controlled Systems.

**UNIT V                      DIGITAL ENGINE CONTROL SYSTEM                      (9)**

Open Loop and Closed Loop Control System – Engine Cooling and Warm Up Control – Idle Speed Control – Acceleration and Full Load Enrichment – Deceleration Fuel Cut-off – Fuel Control Maps – Open Loop Control of Fuel Injection – Closed Loop Lambda Control – Exhaust Emission Control – On Board Diagnostics: Diagnostics – Future Automotive Electronic Systems.

**TOTAL :( L: 45 ) = 45 PERIODS**

**TEXT BOOKS:**

1. Arthur Primrose Young, Leonard Griffiths, "Automobile Electrical and Electronic Equipment: Theory and Practice for Students, Designers, Automobile Electricians and Motorists", London Butterworths, Ninth Edition, 1986.
2. William Ribbens, "Understanding Automotive Electronics: An Engineering Perspective", Butterworth-Heinemann, Seventh Edition, 2013.

#### REFERENCES:

1. Allan Bonnick, "Automotive Computer Controlled Systems" Taylor & Francis, Fifth Edition, 2001.
2. Tom Denton, "Automobile Electrical and Electronics Systems", Butterworth-Heinemann, Fourth Edition, 2004.
3. Robert Bosch GmbH and Horst Bauer, "Gasoline-Engine Management", Bentley Publishers, Second Edition, 2006.

#### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x			x	x				
2						x	x		x			
3	x		x	x		x	x					
4	x	x									x	
5			x	x		x	x					



**15EIZ02 FIBER OPTIC SENSORS**  
**(Common to ALL Branches Except EIE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- This course introduces fundamental physical principles of both classical and modern optics as well as principles of optical design used in the engineering of optical systems.
- The course also provides exposure to practical aspects of optical materials and devices.
- The intention of the course is to provide foundation of basic principles, design methodology, and practical considerations needed to design or use optical and laser instruments in engineering practice.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

CO1: Understand the basic concepts of optical fibres and their properties.

CO2: Have adequate knowledge about the Industrial applications of optical fibres.

CO3: Relate and identify different types of lasers and their applications.

CO4: Demonstrate industrial applications of lasers.

CO5: Understand holography and medical applications of laser.

**UNIT I OPTICAL FIBRES AND THEIR PROPERTIES (9)**

Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion – Connectors & splicers – Fibre termination – Optical sources – Optical detectors.

**UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES (9)**

Fibre optic sensors–Fibre optic instrumentation system – Different types of modulators –Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

**UNIT III LASER FUNDAMENTALS (9)**

Fundamental characteristics of lasers –Three level and four level lasers – Properties of laser – Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers – Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

**UNIT IV INDUSTRIAL APPLICATION OF LASERS (9)**

Laser for measurement of distance, length, velocity, acceleration, current, voltage and atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

**UNIT V HOLOGRAM AND MEDICAL APPLICATIONS (9)**

Holography – Basic principle - Methods – Holographic interferometry and application, Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser and tissue interactive – Laser instruments for surgery, removal of tumours of vocal cards, brain surgery, plastic surgery, gynaecology and oncology.

**TOTAL :( L: 45 ) = 45 PERIODS**

**TEXT BOOKS:**

1. J.M. Senior, 'Optical Fibre Communication – Principles and Practice', Prentice Hall of India, 2009.
2. J. Wilson and J.F.B. Hawkes, 'Introduction to Opto Electronics', Prentice Hall of India, 2001.

**REFERENCES:**

1. Donald J. Sterling Jr, 'Technicians Guide to Fibre Optics', 3rd Edition, Vikas Publishing House, 2000.
2. M. Arumugam, 'Optical Fibre Communication and Sensors', Anuradha Agencies, 2002.
3. John F. Read, 'Industrial Applications of Lasers', Academic Press, 2004.
4. Monte Ross, 'Laser Applications', McGraw Hill, 2008
5. G. Keiser, 'Optical Fibre Communication', McGraw Hill, 2003.
6. Mr. Gupta, 'Fiber Optics Communication', Prentice Hall of India, 2004.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x			x	x				
2						x	x		x			
3	x		x	x		x	x					
4	x	x									x	
5			x	x		x	x					



**15EIZ03 INDUSTRIAL AUTOMATION**  
**(Common to ALL Branches Except EIE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- This course produces students who can use their multidisciplinary skills to meet growing demand from an industry that is pushing the limits of technology by exploiting the growing convergence of these fields.
- The course aims to provide knowledge on fundamentals of robots, robot programming, and its vision system and apply to demonstrate their knowledge in real time application.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

CO1: Demonstrate the concepts of robotic principles and various robot configurations.

CO2: Develop solutions for the robot position and orientation for given application.

CO3: Identify the appropriate configuration for the application.

CO4: Design intelligence systems incorporating real time data capturing using vision systems.

CO5: Understand robotic programming and develop simple robotic systems.

**UNIT I BASIC CONCEPTS (9)**

Definition and origin of robotics –different types of robotics–various generations of robots –degrees of freedom – Asimov's laws of robotics – dynamic stabilization of robots.

**UNIT II POWER SOURCES AND SENSORS (9)**

Hydraulic, pneumatic and electric drives–determination of HP of motor and gearing ratio–variable speed arrangements –path determination –micro machines in robotics–machine vision–ranging –laser –acoustic–magnetic, fiber optic and tactile sensors.

**UNIT III MANIPULATORS, ACTUATORS AND GRIPPERS (9)**

Construction of manipulators–manipulator dynamics and force control–electronic and pneumatic manipulator control circuits–end effectors–U various types of grippers–design considerations.

**UNIT IV KINEMATICS AND PATH PLANNING (9)**

Solution of inverse kinematics problem–multiple solution jacobian work envelop–hill climbing Techniques – robot programming languages

**UNIT V CASE STUDIES (9)**

Mutiple robots–machine interface–robots in manufacturing and non-manufacturing applications –robot cell design–selection of robot.

**TOTAL :( L: 45 ) = 45 PERIODS**

**TEXT BOOKS:**

1. Industrial Robotics (SIE): Technology, Programming and Applications Nicholas Odrey, Mitchell Weiss, Mikell Groover, Roger Nagel, Ashish Dutta , McGrawhill, 2012.
2. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 1999.

**REFERENCES:**

1. S.R. Deb, Robotics technology and flexible Automation, John Wiley, USA 1992.
2. C.R. Asfahl., Robots and manufacturing Automation, John Wiley, USA 1992.
3. R.D. Klafter, T.A. Chimielewski, M. Negin, Robotic Engineering –An integrated approach, Prentice Hall of India, New Delhi, 1994.
4. P.J. Mc Kerrow, Introduction to Robotics, Addison Wesley, USA, 1991.
5. Issac Asimov I Robot, Ballantine Books, New York, 1986.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x			x	x				
2						x	x		x			
3	x		x	x		x	x					
4	x	x									x	
5			x	x		x	x					



Approved by Seventh Academic Council

**15EIZ04 ULTRASONIC INSTRUMENTATION**  
**(Common to ALL Branches Except EIE)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To know the generation and detection of ultrasonic waves and to provide knowledge on the concepts of Ultrasonic Instrumentation.

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

CO1: Understand the applications of ultrasonic instrumentation

CO2: Characterize the ultrasonic waves

CO3: Analyze the sensors used in ultrasonic application

CO4: Apply the concepts to make simple applications

CO5: Model and analyze ultrasonic systems.

**UNIT I                      ULTRASONIC WAVE CHARACTERISTICS                      (9)**

Principles and propagation of various waves, Characterization of ultrasonic transmission, Reflection and Transmission coefficients, Intensity and attenuation of sound beam.

**UNIT II                      GENERATION/DETECTION OF ULTRASONIC WAVES                      (9)**

Magnetostrictive and piezoelectric effects, Detection of Ultrasonic Waves: Mechanical, Optical and Electrical Method, Precise Measurement: Pulse– echo Overlap, Cross correlation

**UNIT III                      ULTRASONIC TEST METHODS                      (9)**

Ultrasonic test methods: pulse echo, transit time, resonance, direct contact and immersion type and ultrasonic methods of flaw detection.

**UNIT IV                      ULTRASONIC MEASUREMENTS                      (9)**

Ultrasonic measurements: ultrasonic methods of measuring thickness, depth and flow, variables affecting ultrasonic testing in various applications.

**UNIT V                      ULTRASONIC APPLICATIONS                      (9)**

Ultrasonic methods of flaw detection, Flow meters, Density measurement, Viscosity measurement, Level measurement, Sensor for Temperature and Pressure measurements, Measuring thickness, Depth, Rail Inspection, SONAR, Inspection of Welds and defect detection in welds

**TOTAL :( L: 45 ) = 45 PERIODS**

**TEXTBOOKS:**

1. Baldev Raj, V.Rajendran, P.Palanichamy, "Science and Technology of Ultrasonics",Alpha Science International, UK, 2004.
2. LawrenceE.Kinsler, Austin R.Frey, Alan B.Coppens, James V. Sanders, "Fundamentals of Acoustics," John Wiley and Sons Inc,USA, 2000.

**REFERENCES:**

1. J.David N.Cheeke,"Fundamentals and Applications of Ultrasonic Waves," CRC Press, Florida, 2002
2. L.A. Bulavin, YU.F.Zabashta, "Ultrasonic Diagnostics in Medicine," VSP, Koninklijke, Brill,Boston, 2007.
3. Emmanuel P. Papadakis, "Ultrasonic Instruments and Devices"Academic Press,1999.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1				x			x	x				
2						x	x		x			
3	x		x	x		x	x					
4	x	x									x	
5			x	x		x	x					



Approved by Seventh Academic Council

## 15ITZ01 - PC HARDWARE AND TROUBLE SHOOTING

(Common to All branches except IT Branches)

L	T	P	C
3	0	0	3

### OBJECTIVE:

- This course will provide participant a much needed knowledge of computer hardware and networking, enabling them to identify and rectify the onboard computer hardware, software and network related problems.
- Upgrading of existing hardware / software as and when required. The main aspect of this program is to eliminate cost for the computer engineer boarding the vessel for troubleshoot, install / configure the application program and network related problems and there by charging exorbitant fees to ship owners / managers.

### COURSE OUTCOMES:

At the end of the course, the student will be able to

CO1: Disassemble and reassemble a working computer Handle and repair

CO2 : Establish a local computer network & Load and configure a working Windows Operating System

CO3 : Make minor repairs and upgrades to a laptop computer& evaluate a computer system for individual customers, making suggestions to optimize the system for the individual

CO4 : Implement the design using Objective C and los

CO5 : Configure the power management features on a computer system, Troubleshoot, configure and repair printers.

### UNIT I INTRODUCTION

(9)

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers - Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

### UNIT II PERIPHERAL DEVICES

(9)

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

### UNIT III PC HARDWARE OVERVIEW

(9)

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

### UNIT IV INSTALLATION AND PREVENTIVE MAINTENANCE

(9)

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

### UNIT V TROUBLESHOOTING

(9)

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

**TOTAL :( L: 45 ) = 45 PERIODS**

### TEXT BOOK:

1. B. Govindarajalu, "IBM PC Clones Hardware, Troubleshooting and Maintenance", 2/E, TMH, 2002.

Approved by Seventh Academic Council

**REFERENCES:**

1. Peter Abel, Niyaz Nizamuddin, "IMB PC Assembly Language and Programming", Pearson Education, 2007.
2. Scott Mueller, "Repairing PC's", PHI, 1992

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	
1							x	x	x		x	
2				x								
3		x							x			
4		x		x			x			x	x	
5		x	x		x		x	x			x	



## 15ITZ02 - CYBERCRIME INVESTIGATIONS AND DIGITAL FORENSICS

(Common to All branches except IT Branch)

L	T	P	C
3	0	0	3

### OBJECTIVE:

- To give knowledge of constitutional and case law to search and capture digital evidence, determine the most effective and appropriate forensic response strategies to digital evidence, and provide effective proof in a case involving digital evidence.

### COURSE OUTCOMES:

At the end of the course, the student will be able to

CO1: To have various ideas about cybercrime.

CO2: To have knowledge of the various issues of cybercrime.

CO3 : To investigate and find the cybercrime.

CO4: To identify the cybercrime.

CO5: To have clear idea of the various laws and acts.

### UNIT I INTRODUCTION

(9)

Introduction and Overview of Cyber Crime - Nature and Scope of Cyber Crime - Types of Cyber Crime: Social Engineering - Categories of Cyber Crime - Property Cyber Crime.

### UNIT II CYBER CRIME ISSUE

(9)

Unauthorized Access to Computers - Computer Intrusions - White collar Crimes - Viruses and Malicious Code - Internet Hacking and Cracking - Virus Attacks – Software Piracy - Intellectual Property - Mail Bombs - Exploitation - Stalking and Obscenity in Internet - Digital laws and legislation - Law Enforcement Roles and Responses.

### UNIT III INVESTIGATION

(9)

Introduction to Cyber Crime Investigation - Investigation Tools – Discovery - Digital Evidence Collection - Evidence Preservation - E-Mail Investigation – Tracking - IP Tracking - E-Mail Recovery - Hands on Case Studies - Encryption and Decryption Methods - Search and Seizure of Computers - Recovering Deleted Evidences - Password Cracking.

### UNIT IV DIGITAL FORENSICS

(9)

Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography - Face, Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics.

### UNIT V LAWS AND ACTS

(9)

Laws and Ethics - Digital Evidence Controls - Evidence Handling Procedures - Basics of Indian Evidence ACT IPC and CrPC - Electronic Communication Privacy ACT - Legal Policies.

**TOTAL :( L: 45 ) = 45 PERIODS**

### TEXT BOOKS:

- Nelson Phillips and Enfinger Stuart, —Computer Forensics and InvestigationsII, Cengage Learning, New Delhi, 2009.
- Kevin Mandia, Chris Prosise, Matt Pepe, —Incident Response and Computer Forensics —Tata McGraw - Hill, New Delhi, 2006.

### REFERENCES:

- Robert M Slade, Software Forensics , Tata McGraw Hill, New Delhi, 2005.
- Bernadette H Schell, Clemens Martin, —Cybercrime, ABC – CLIO Inc, California, 2004.
- Understanding Forensics in IT — NIIT Ltd, 2005.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	
1							x	x	x			
2				x			x		x			
3						x			x			
4				x		x				x	x	
5			x		x		x	x			x	



**15ITZ03 - DEVELOPING MOBILE APPS**  
**(Common to All branches except IT Branch)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- Understand system requirements for mobile applications.
- Generate suitable design using specific mobile development frameworks.
- Generate mobile application design.
- Implement the design using specific mobile development frameworks.
- Deploy the mobile applications in marketplace for distribution.

**COURSE OUTCOMES:**

At the end of the course, students will be able to

CO1: Describe the requirements for mobile applications

CO2: Explain the challenges in mobile application design and development

CO3: Implement the design using Android SDK

CO4: Implement the design using Objective C and iOS

CO5: Deploy mobile applications in Android and iPhone marketplace for distribution

**UNIT I INTRODUCTION**

**(9)**

Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications.

**UNIT II BASIC DESIGN**

**(9)**

Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.

**UNIT III ADVANCED DESIGN**

**(9)**

Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.

**UNIT IV TECHNOLOGY I - ANDROID**

**(9)**

Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

**UNIT V TECHNOLOGY II - IOS**

**(9)**

Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.

**TOTAL :( L: 45 ) = 45 PERIODS**

**TEXT BOOKS:**

1. <http://developer.android.com/develop/index.html>.
2. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012

**REFERENCES:**

1. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012
2. James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
3. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 Development: Exploring the iOS SDK", Apress, 2013.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	
1								x				
2					x		x					
3		x				x			x			
4				x		x		x		x	x	
5			x		x		x	x			x	



**15ITZ04 - SOFTWARE PROJECT MANAGEMENT**  
**(Common to All branches except IT Branch)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To plan and manage projects at each stage of the software development life cycle (SDLC).
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals.

**COURSE OUTCOMES:**

At the end of the course, students will be able to

CO1: Evaluate and select the most desirable projects & Identify desirable characteristics of effective project managers.

CO2: Apply appropriate approaches to plan a new project.

CO3: Apply appropriate methodologies to develop a project schedule.

CO4: Develop a suitable budget for a new project & Identify important risks facing a new project.

**UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT (9)**

Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning.

**UNIT II PROJECT EVALUATION (9)**

Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

**UNIT III ACTIVITY PLANNING (9)**

Objectives – Project Schedule – Sequencing and Scheduling Activities –NetworkPlanning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

**UNIT IV MONITORING AND CONTROL (9)**

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

**UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS (9)**

Introduction – Understanding Behavior – Organizational Behaviour: A Background –Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation– The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.

**TOTAL :( L: 45 ) = 45 PERIODS**

**TEXT BOOK:**

1. Bob Hughes, Mikecoterrell, "Software Project Management", Third Edition, Tata McGraw Hill, 2004.

**REFERENCES:**

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, "Software Project Management", Pearson Education, 1999.
3. Jalote, "Software Project Management in Practice", Pearson Education, 2002.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	
1	x							x	x			
2			x				x					
3		x				x			x			
4	x			x				x		x	x	
5			x		x		x	x			x	



**15MEZ01 SIX SIGMA**  
**(Common to All Branches except Mechanical Engineering)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To introduce the techniques and phases of six sigma
- To acquire knowledge on design for six sigma during product development stage
- To introduce the lean concepts in service sectors

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1: Formulate the six sigma project definition for process improvement in an industry
- CO2: Summarize the stages in preparation of technical requirements and team formation
- CO3: Create a project definition document and/or assess the process condition through collected data
- CO4: Apply the six sigma tools to analyze the process parameters and/or identify the scope for process improvement
- CO5: Recommend a system to sustain the results and/or list the tools in design for six sigma and lean servicing

**UNIT I : INTRODUCTION**

**(9)**

Overview of Six Sigma and Lean Manufacturing - 6 sigma, TQM & MBNQA - common terms - organizational success factors - leadership, strategic initiative - internal communication - launching of 6 sigma - organizational structure - six sigma training plan - project selection - assessing organizational readiness - common pitfalls - work as a process - vertical functions and horizontal processes.

**UNIT II : PREPARATION PHASE**

**(9)**

Voice of the customer - importance, identify the customer, collect VOC data, Critical-to-Quality customer requirements - project management - challenges - project culture - project management processes - team typing - team stages - understanding team dynamics - forming, storming, norming, performing, characteristics of effective teams.

**UNIT III : DEFINE AND MEASURE PHASE**

**(9)**

DMAIC Phases - define phase overview - project charter - voice of the customer - high level process map - project team - measure phase overview - statistical methods - normal distribution - Population Parameters Vs Sample Statistics - sampling plan - data collection plan - choosing statistical software - measure tools - measurements - cost of poor quality - probability distributions - measurement system analysis - Process Capability.

**UNIT IV: ANALYZE AND IMPROVE PHASE**

**(9)**

Overview - process analysis - hypothesis testing - statistical tests and tables - tools for analyzing relationships among variables - survival analysis - improve phase overview - process redesign - generating improvement alternatives - design of experiments - pilot experiments - Cost/Benefit Analysis - implementation plan - card one case study improve phase results.

**UNIT V : CONTROL PHASE, DESIGN FOR SIX SIGMA AND LEAN SERVICING**

**(9)**

Control phase overview - control plan - process scorecard - failure mode and effects analysis - SPC Charts - final project report and documentation - design for six sigma overview - DFSS Tools - Quality Function Deployment - TRIZ - Lean Production Overview - lean servicing concepts - getting started with lean - continuous flow production.

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

1. Michael L George, David T Rowlands, and Bill Kastle, "What is Lean Six Sigma", McGraw Hill, New York, 2004
2. Betsi Harris Ehrlich, "Transactional Six Sigma and Lean Servicing", St. Lucie Press, 2002.

**REFERENCES:**

1. Kai Yang and Basem El Haik, "Design for Six Sigma", McGraw Hill, New York, 2004
2. Thomas Pyzdek, "Six Sigma Handbook: Complete Guide for Green belts, Black belts and Managers at All Levels", Tata McGraw Hill Companies Inc, 2003
3. Donald W Benbow and Kubiak T M, "Certified Six Sigma Black Belt Handbook", Pearson Education, 2007
4. Urdhwarashe, "Six Sigma for Business Excellence", 1<sup>st</sup> ed., Pearson Education India, 2010
5. Gopalakrishnan. N, "Simplified Six Sigma: Methodology, Tools and Implementation, Prentice Hall India, 2012.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x						x			x
2	x	x	x		x		x		x		x	x
3	x	x	x		x		x		x		x	x
4	x	x	x	x	x		x		x		x	x
5	x	x	x	x	x		x		x		x	x



Approved by Seventh Academic Council

**15MEZ02 PROJECT MANAGEMENT**  
**(Common to All Branches except Mechanical Engineering)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To gain knowledge about project, project management and its basics
- To know stages of project management in an organization
- To understand the roles and responsibilities of a project manager

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1: Demonstrate the skill set of a project manager
- CO2: Develop skills in managing project works by effective team building
- CO3: Strategize proper plan and premeditate the risks related to projects
- CO4: Phase the project work as various stages and develop skills to control the project
- CO5: Apply project management concepts by identifying and carrying out a real time project

**UNIT I : PROJECTS, PROJECT MANAGEMENT AND PROJECT MANAGER (9)**

Project Management - process context - interpersonal and behavioral context - organizational context - defining project success - responsibilities of project manager - common challenges expected to face - skill requirements and functional competencies - unofficial job duties - value of introspection and self-awareness to the soft side

**UNIT II : PROJECT DEFINITION, EFFECTIVE TEAM BUILDING (9)**

Evolution of projects - understanding the problem - identification of optimum solution - development of solution and preliminary plan - formal launching of project - evaluation of political environment - mechanics of building a team - team leadership - fostering teamwork and synergism - getting the most from team members

**UNIT III : PROJECT PLANNING, RISK AND UNCERTAINTY (9)**

Project Planning - estimating - scope management - time management - cost management - project management software - understanding risk and uncertainty - managing risk - identifying what can hurt you - quantifying how badly you can get hurt - analyzing the biggest threats - responding to high-threat problems - accommodating uncertainty

**UNIT IV: PROJECT CONTROL AND INTERFACES (9)**

Project Control - Establishing a Baseline of Measurement - Information Needs - Information Gathering - ensuring Good Information - Analyzing the Information - Reacting to the Information - Project Interfaces - Roles of Internal Stakeholders and External Stakeholders - Other Interfaces - Considerations in Interface Management

**UNIT V : PROJECT COMMUNICATION, DOCUMENTATION AND CONCLUSION (9)**

Configuration plan - documentation and communication road map - methods of communicating - guidelines for effective communication - conducting high quality meetings - communication skills - key project documentation - early termination - key elements in project closure - punch list approach - project completion checklist

**TOTAL (L:45) : 45 PERIODS**

**TEXTBOOKS:**

1. Gary R. Heerkens, "Project Management", 2<sup>nd</sup> ed., McGraw-Hill Book Company, 2013

**REFERENCES:**

1. Harold Kerzner, "Project Management", 12<sup>th</sup> ed., John Wiley & Sons, 2017
2. John M Nicholas, Herman Steyn, "Project Management for Engineering, Business and Technology", 5<sup>th</sup> ed., Taylor&Francis, 2016
3. Prasanna Chandra, "Projects : Planning, Analysis, Selecting, Financing, Implementation and Review", 8<sup>th</sup> ed., McGraw Hill Education, 2017
4. Eric W Larson and Clifford F Gray, Gautam V Desai, "Project Management: The Managerial Process", 6<sup>th</sup>ed., McGraw Hill Education, 2017

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x			x			x			x
2	x		x		x		x		x		x	x
3	x		x		x		x		x		x	x
4	x	x	x	x	x		x		x		x	x
5	x	x	x	x	x		x		x		x	x



Approved by Seventh Academic Council

**15MEZ03 ELECTRIC VEHICLE TECHNOLOGY**  
**(Common to All Branches except Mechanical Engineering)**

L	T	P	C
3	0	0	3

**OBJECTIVE:**

- To introduce the working principles of batteries and their types
- To acquire knowledge on applications of alternative energy sources in vehicles
- To introduce the electrical drives, mathematical modeling and design considerations

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1: Differentiate the types of batteries which are used in electrical vehicles
- CO2: List the types of alternative energy sources and/or working principles of fuel cells
- CO3: Assess the potential of hydrogen energy in vehicles and energy storage techniques
- CO4: Recommend an electrical drive and its controller in vehicular applications
- CO5: Explain the concepts of electric vehicle modeling and design aspects

**UNIT I : INTRODUCTION AND BATTERIES**

**(9)**

Types of electric vehicle - battery parameters - lead acid batteries - nickel based batteries - battery charging - designer's choice of battery - use of batteries in hybrid vehicles - battery modelling.

**UNIT II : ALTERNATIVE ENERGY SOURCES AND FUEL CELLS**

**(9)**

Solar photovoltaics - wind power - flywheels - super capacitors - supply rails - hydrogen fuel cells - fuel cell thermodynamics - connecting cells in series - water and thermal management in PEM fuel cell.

**UNIT III : HYDROGEN SUPPLY AND STORAGE**

**(9)**

Introduction - fuel reforming - fuel cell requirements, steam reforming, partial oxidation and autothermal reforming, further fuel processing, mobile applications - storage as hydrogen - chemical methods.

**UNIT IV: ELECTRIC MACHINES AND CONTROLLERS**

**(9)**

Brushed DC electric motor - DC regulation and voltage conversion - brushless electric motors - motor cooling, efficiency, size and mass - electrical machines for hybrid vehicles.

**UNIT V : ELECTRIC VEHICLE MODELLING AND DESIGN CONSIDERATIONS**

**(9)**

Introduction - tractive effort - modelling vehicle acceleration and electric vehicle range - simulations - aerodynamic considerations - rolling resistance - transmission efficiency - vehicle mass - general issues

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

1. James Larminie, John Lowry, "Electric Vehicle Technology Explained", John Wiley & Sons Ltd., 2015
2. Iqbal Husain, "Electric and Hybrid Vehicles", 2<sup>nd</sup> ed., CRC Press, 2010.

**REFERENCES:**

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles", 2nd ed., CRC Press 2009
2. Chau.K.T, "Electric vehicle machines and drives", Wiley-IEEE Press, 2015
3. James D Halderman, "Hybrid and Alternative Fuel Vehicles", 3rd Revised edition, Pearson Education, 2012
4. Jingyu Yan , Huihuan Qian , Yangsheng Xu, "Hybrid Electric Vehicle Design and Control", McGraw-Hill Professional Publishing, 2013
5. Chris Mi; M. Abul Masrur and David Wenzhong Gao, "Hybrid Electric Vehicles", John Wiley & Sons, 2011

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x		x		x		x				x	x
2	x		x		x		x				x	x
3	x		x		x		x				x	x
4	x		x		x		x				x	x
5	x		x		x		x				x	x



Approved by Seventh Academic Council

**15MEZ04 VALUE ENGINEERING**  
**(Common to All Branches except Mechanical Engineering)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To introduce the concept of value engineering for eliminating the unnecessary costs of a product
- To acquire knowledge on various value engineering techniques, team dynamics and job plan
- To introduce the financial aspects and human factors of value engineering

**COURSE OUTCOMES:**

At the end of the course, the students will be able to

- CO1: Estimate the value of a product and/or identify the primary and secondary functions of a product
- CO2: Determine the cost, worth of a product and their elements
- CO3: Demonstrate the value engineering techniques for industrial applications
- CO4: Summarize the stages in team dynamics and value engineering job plan
- CO5: Illustrate the financial aspects and human factors of value engineering

**UNIT I : VALUE AND FUNCTION**

**(9)**

Seven types values - economic value - cost, use, esteem and exchange values - mathematical model of value - types and levels of functions - function identification - method of finding functions of a product - case study - vocabulary of verbs and nouns.

**UNIT II : COST AND WORTH**

**(9)**

Cost and price - elements of cost - direct material, direct labour, direct expenses, overheads - calculation of cost - case study - method of determining function cost - evaluation of worth - guidelines to find out worth - value gap and value index.

**UNIT III : VALUE ENGINEERING TECHNIQUES**

**(9)**

Brainstorming and Gordon techniques - feasibility ranking - morphological analysis technique - ABC analysis - probabilistic approach - make or buy - function-cost-worth analysis - FAST - weighted evaluation method - evaluation matrix - life cycle cost.

**UNIT IV: TEAM DYNAMICS AND JOB PLAN**

**(9)**

Team structure - team building - physical, intellectual, spiritual transformations - job plan - orientation phase - information phase - function phase - creative phase - evaluation phase - recommendation phase - implementation phase - audit phase.

**UNIT V : FINANCIAL ASPECTS AND HUMAN RELATION**

**(9)**

Break-even point - payback period - return on investment - discounted cash flows - balance sheet and profit and loss account - human aspects in value engineering - individual ego states - techniques of transactions - human interactions - Managerial grid

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

1. Mukhopadhyaya A K, "Value Engineering", Sage Publications Pvt. Ltd., New Delhi, 2003
2. Mukhopadhyaya A K, "Value Engineering Mastermind", Sage Publications Pvt. Ltd., New Delhi, 2009

**REFERENCES:**

1. Richard J Park, "Value Engineering - A plan for inventions", St.Lucie Press, London, 1998.
2. Iyer. S. S, "Value Engineering: A How to Manual", 3<sup>rd</sup> ed., New age publishers, 2009
3. Larry W Zimmesman. P E , "VE - A Practical approach for owners designers and contractors", 1<sup>st</sup> ed., CBS Publishers, Delhi, 1992
4. Theodore C. Fowler, "Value Analysis in Design", John Wiley & Sons, 1997
5. Arthus E Mudge, "Value Engineering", McGraw Hill book company, 1971

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x			x				x			x
2	x	x			x				x		x	x
3	x	x			x				x		x	x
4	x	x			x				x		x	x
5	x	x			x				x		x	x



Approved by Seventh Academic Council

**15MYZ01- MATHEMATICAL STRUCTURES**  
( Common to All Branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To understand the basic concepts of logic and their applications.
- To give you a familiarity with rigour and a grounding in the art of formal reasoning.
- To understand the concepts of sets and relations.
- To understand basic concepts of functions.
- To understand the characteristic of a group and the coset

**COURSE OUTCOMES:**

At the end of this course, the students would know

- CO1 : To extend the logical and mathematical ability to deal with abstraction.  
CO2 : Be aware of counting principle  
CO3 : Exposed to concepts and properties of set theory  
CO4 : Identify and analyze the basic proofs involving functions.:  
CO5 : Be exposed to concepts and properties of algebraic structures such as Semi groups

**UNIT I - PROPOSITIONAL CALCULUS**

(9)

Propositions - Logical connectives-Compound propositions - Conditional and biconditional propositions - Truth tables - Tautologies and Contradictions - Logical and Equivalences and implications - DeMorgan's Laws - Normal forms

**UNIT II – PREDICATE CALCULUS**

(9)

Predicates - Statement Function – Variables - free and bound variables – Quantifiers - Universe of discourse -Logical equivalences and implications for quantified statements

**UNIT III – SET THEORY**

(9)

Cartesian product of sets- Relations of sets-Types of relations and their properties – Relational matrix and the graph of a relation- Equivalence relations – Partial ordering – Poset – Hasse diagram.

**UNIT IV – FUNCTIONS**

(9)

Definition – Classification of functions – Composition of functions – Inverse functions – Binary and n-ary operations – Characteristic function of a set..

**UNIT V – ALGEBRAIC STRUCTURES**

(9)

Algebraic systems - Semi groups and monoids - Groups – Subgroups - Homomorphisms – Normal subgroup and coset – Lagrange's theorem..

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

1. **Tremblay J.P and Manohar R**, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw-HILL, New Delhi, 30<sup>th</sup> Reprint 2011.
2. **Veerarajan.T**, "Discrete Mathematics with Graph Theory and Combinatorics", Fourth Edition, Tata McGraw Hill , New Delhi, Reprint 2013.

**REFERENCES:**

1. **Kenneth H.Rosen**, "Discrete Mathematics and its Applications", Fifth Edition, Tata McGraw- Hill publications, New Delhi 2012.
2. **Venkatraman M.K.**, "Discrete Mathematics", The National Publishing Company, Chennai,2007.

**Mapping of Course Outcomes (COs) and Programme Outcomes (POs)**

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x									
2	x	x		x								x
3	x		x				x					
4	x	x					x		x			
5	x	x	x								x	



**15MYZ02- OPTIMIZATION TECHNIQUES**  
( Common to All Branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To provide the concept and an understanding of basic concepts in Operations Research.
- To understand, develop and solve mathematical model of Transport and assignment problems.
- To understand, develop and solve mathematical model of linear programming problems.
- To provide Techniques for Analysis and Modeling in Computer Applications.
- To understand network modeling for planning and scheduling the project activities

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 : Construct and solve linear programming models to answer business optimization
- CO2 : Apply transportation and assignment models to find optimal solution in warehousing and Travelling.
- CO3 : Prepare project scheduling using PERT and CPM.
- CO4 : Appraise theoretical predictions obtained from Game Theory analyses against real world conflicts.
- CO5 : Identify and analyze appropriate queuing model to reduce the waiting time in queue

**UNIT I - LINEAR PROGRAMMING MODELS**

(9)

Mathematical Formulation - Graphical Solution of Linear Programming Models - Simplex Method - Big-M Method

**UNIT II – TRANSPORTATION AND ASSIGNMENT MODELS**

(9)

Mathematical Formulation of Transportation Problem - Methods for Finding Initial Basic Feasible Solution: North West Corner Rule, Least Cost Method, VAM - Optimum solution – Mathematical Formulation of Assignment Models.

**UNIT III – PERT AND CPM**

(9)

Network Construction – Critical Path Method – Project Evaluation and Review Technique

**UNIT IV– GAME THEORY**

(9)

Definition - Pay-off - Two Person Zero - Sum Games -The Maximin - Minimax Principle - Games without Saddle Points (Mixed Strategies) - 2x2 Games without Saddle Points - Graphical Method for 2xn or mx2 Games.

**UNIT V – QUEUING MODELS**

(9)

Characteristics of Queuing Models – Poisson Queues – (M/M/1): (FIFO/ $\infty/\infty$ ), (M/M/1): (FIFO/N/ $\infty$ ), (M/M/C): (FIFO/ $\infty/\infty$ ), (M/M/C) : (FIFO/N/ $\infty$ ) Models.

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

1. Taha, H.A. "Operations Research: An Introduction", 8th Edition, Pearson Education, 2008.
2. V.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan, "Resource Management Techniques", A.R.Publication, 2002.

**REFERENCES:**

1. A .M. Natarajan, P. Balasubramani, A.Tamilarasi, "Operations Research" , Pearson Education, Asia, 2005.
2. Prem Kumar Gupta , D.S. Hira "Operations Research", S. Chand & Company Ltd., New Delhi, Third Edition, 2003.
3. Manmohan .,Kandi swarp.,Gupta., "Operations Research",Sultan Chand & Sons(first edition),New delhi."

# Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x								x
2	x	x					x		x		x	x
3	x	x	x			x					x	
4	x		x								x	x
5	x								x		x	x

*Manoj Kumar*

**15MYZ03- STATICS FOR ENGINEERS**  
**( Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To Aware knowledge of parallel forces
- To know the concept of equilibrium of forces.
- To acquire the knowledge of moments and couples.
- To know resultant of co-planar forces acting on a rigid body.
- To learn the necessary and sufficient conditions of equilibrium.
- 

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 : Knowledge about different types of forces and their resultant
- CO2 : To bring the polygon of forces to be in equilibrium.
- CO3 : Moments and couples of parallel forces.
- CO4 : To know about co-planar forces.
- CO5 : Necessary and sufficient conditions to bring the equilibrium of forces.

**UNIT I - TYPES OF FORCES**

(9)

Forces acting at a point – Parallelogram law – triangle law

**UNIT II – EQUILIBRIUM OF FORCES**

(9)

( $\lambda$ ,  $\mu$ ) theorem – Polygon of forces – conditions of equilibrium.

**UNIT III – MOMENTS AND COUPLES**

(9)

Parallel forces – Moments and couples composition of parallel forces (like and unlike).

**UNIT IV – CO-PLANAR FORCES**

(9)

Moment of a force about a point – Varignons theorem – Co-planar forces acting on a rigid body – Theorem on three co-planar forces in equilibrium

**UNIT V – REDUCTION OF A SYSTEM OF CO-PLANAR FORCES**

(9)

Reduction of a system of co-planar forces to a single force and a couple – necessary and sufficient conditions of equilibrium only – Equation to the line of action of the resultant.

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOK:**

1. M.K.Venkataraman, Statics, Agasthiar Publications, Trichy, 1999

**REFERENCES :**

1. A.V.Dharmapadam, Statics, S.Viswanathan Printers and Publishing Pvt., Ltd, 1993.
2. P.Duraipandian and Laxmi Duraipandian, Mechanics, S.Chand and Company Ltd, Ram Nagar, New Delhi-55,

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	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x		x			x		x	
2	x	x	x	x		x			x		x	
3	x	x	x	x		x			x		x	
4	x	x	x	x		x			x		x	
5	x	x	x	x		x			x		x	

*McGonigle*

**15MYZ04- STATISTICS FOR ENGINEERS**  
( Common to All Branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To assess the validity of statistical conclusions.
- To determine the outcomes and probabilities for experiments.
- To Understand how to develop Null and Alternative Hypotheses
- To understand difference between Parametric and Nonparametric Statistical Procedures.
- To estimate the relationships among variables

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 : The fundamental knowledge of basic statistics and probability distribution concepts.
- CO2 : Empirical distribution of sample means is closer to bell shaped when the size of the sample increases.
- CO3 : The knowledge of test of Hypothesis as well as to calculate confidence limits for a given population parameter for single sample and two sample cases.
- CO4 : Various methods of non parametric tests and concepts related to the testing of hypothesis.
- CO5 : The application of correlation, regression and time series analysis in various aspects.

**UNIT I INTRODUCTION TO STATISTICS**

(9)

Statistics – Definition, Types. Types of variables – Organizing data – Descriptive Measures: Mean, Median, Mode, Standard Deviation, Mean Deviation.

**UNIT II INTRODUCTION TO PROBABILITY**

(9)

Basic definitions and rules for probability - conditional probability - independence of events - Probability distributions: Binomial, Poisson and Normal distributions.

**UNIT III TESTING OF HYPOTHESIS**

(9)

Hypothesis testing: one sample and two sample tests for means and proportions of large samples(z-test), one sample and two sample tests for means of small samples (t-test), F-test for two sample standard deviations. ANOVA one way and two ways.

**UNIT IV NON-PARAMETRIC METHODS**

(9)

Chi-square test for single sample standard deviation. Chi-square tests for independence of attributes and goodness of fit. Rank sum test. Kolmogorov – Smirnov – test for goodness of fit, comparing two populations. Mann – Whitney U test and Kruskal Wallis test.

**UNIT V CORRELATION, REGRESSION AND TIME SERIES ANALYSIS**

(9)

Correlation analysis, estimation of regression line. Time series analysis: variations in time series, Trend analysis, Cyclical variations, seasonal variations and irregular variations (Self-study).

**TOTAL :( L: 45) = 45 PERIODS**

**TEXT BOOKS:**

1. Richard I. Levin, David S. Rubin, Statistics for Management, 7th Ed, 2011.
2. Aczel A.D. and Sounderpandian J., Complete Business Statistics 6th edition, Tata McGraw – Hill, Publishing company Ltd, New Delhi, 2012.

**REFERENCES:**

1. Srivatsava TN and Shailaja rego, Statistics for Management Tata McGraw Hill, 2008.
2. Ken Black, Business Statistics, 6th Ed., Wiley India Edition, 2009.
3. Anderson D.R. Sweeney D.J. and Williams T.A., Statistics for business and economics, 9th edition, Thomson (South- Western) Asia, Singapore, 2012.
4. N.D.Vohra, Business Statistics, Tata McGraw Hill, 2012.

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COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x	x	x	x					x		x	
2	x	x	x		x	x	x			x	x	
3	x	x	x			x	x				x	
4	x	x	x	x					x	x	x	
5	x	x	x		x	x					x	

McGraw-Hill

**15PYZ01- NANOMATERIALS**  
( Common to All Branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To provide basic knowledge about nanomaterials
- To understand the properties of nanomaterials and the mechanisms used in characterization
- To provide in-depth knowledge in characterization of nanomaterials in engineering and biology.
- To provide knowledge various testing mechanisms adopted for nanomaterials
- To understand the ways of full utilization of nanomaterials in various fields

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 : Acquire knowledge of basics of nanomaterials
- CO2 : Understand the peculiar properties of nanomaterials
- CO3 : Know the various microscopy techniques involved in analysis of nanomaterials
- CO4 : Understand the synthesis of different types of nanomaterials
- CO5 : Appreciate the application of nanomaterials in engineering and biology

**UNIT I - FUNDAMENTAL PRINCIPLES OF NANOMATERIALS**

(9)

Size & scale, units, scaling Laws, atoms, molecules & clusters, super molecules, nanoscale phenomena; Tunneling, Chemical Bonds (types and strength); Intermolecular forces, molecular and crystalline structures; Hierarchical structures and functionality; Surfaces and interfaces, bulk to surface transition, self-assembly and surface reconstruction.

**UNIT II – PROPERTIES OF NANO MATERIALS**

(9)

Size dependence of properties, phenomena and properties at nanoscale; Mechanical/frictional, optical, electrical transport; Magnetic properties.

**UNIT III – SYNTHESIS OF NANOMATERIALS**

(9)

Fabrication techniques: Self-assembly, self-replication, sol-gels; Langmuir-Blodgett thin films, nanolithograph, bio-inspired syntheses, microfluidic processes; Chemical vapor deposition; Semiconductors, cadmium sulfide, silicon, fullerenes carbon nanotubes; Nano-composites, nanoporous materials, biological materials.

**UNIT IV –NANOMATERIAL CHARACTERIZATION**

(9)

Electron microscopy, scanning probe microscopies, near field microscopy, micro- and near field Raman spectroscopy, surface-enhanced Raman, spectroscopy, X-ray photoelectron spectroscopy.

**UNIT V –APPLICATIONS OF NANOMATERIALS**

(9)

Nanoelectronics, Nanosensors, environmental, biological, energy storage and fuel cells.

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

- 1 Edelstein A. A. and Cammarata R .C., "Nanomaterials- Synthesis, Properties and Applications", Institute of Physics Publishing, 1998.
- 2 Nalwa H.S., "Handbook of Nanostructured Materials and Nanotechnology", Vols. 1- 5, Academic Press 2000.

**REFERENCES:**

1. Benedek et al G., "Nanostructured Carbon for Advanced Applications", Kluwer Academic Publishers 2001.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x											
2	x											
3					x							
4	x				x							
5	x											

*Manoj Kumar*

**15PYZ02- NUCLEAR PHYSICS AND REACTORS**  
**( Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To provide knowledge of building block of nature –Nuclei –and its interaction with light
- To provide knowledge about the various reactors and power generation
- To empower knowledge in core science of reactor designing.
- To provide the understanding of different types of reactors
- To provide understanding of effective methods to utilize the nuclear energy

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 : Acquire knowledge regarding fundamentals of nuclear reactions  
CO2 : Understand the interaction of light with matter  
CO3 : Acquire the knowledge about power generation form nuclear reactions  
CO4 : Understand the mechanisms involved in reactor designing  
CO5 : Enhance knowledge of thermal energy generation and reactor safety

**UNIT I - STRUCTURE OF NUCLEI AND REACTIONS**

(9)

Fundamental particles, structure of nuclei; Binding Energy – nuclear stability – radioactive decay-nuclear reactions

**UNIT II – INTERACTION OF RADIATION WITH MATTER**

(9)

Neutron interactions- energy loss in scattering collisions. Nuclear fission reaction- gamma ray interaction with matter-charged particles.

**UNIT III – NUCLEAR REACTOR AND NUCLEAR POWER**

(9)

Fission chain reaction – reactor fuels. Nuclear power resources- power plants –nuclear reactors

**UNIT IV–NUCLEAR REACTOR THEROY**

(9)

One group reactor equation –slab reactor –thermal reactor –reflected reactor

**UNIT V –HEAT REMOVAL FROM NUCLEAR REACTORS**

(9)

Heat generations in reactors – heat flow in reactors, heat transfer mechanism. Radiation shielding: Gamma ray shielding, nuclear reactor shielding.

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOK:**

1. Leroy Murray Raymond, :Nuclear Reactor Physics”, Prentice Hall

**REFERENCE:**

1. R. Lamarsh John, J. Baratta Anthony, “Introduction to Nuclear Engineering”.

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

[illegible]

M Group Lebanon

**15PYZ03- SPACE SCIENCE AND TECHNOLOGY**  
**( Common to All Branches)**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To provide basics of space technology
- To give a knowledge of Space transportation systems
- To provide the understanding of transportation and satellite communication
- To understand the various space programs undertaken by international organizations
- To provide knowledge of application of space technology and manned missions

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO1 : Acquire knowledge about classical theory of satellite orbits.  
CO2 : Understand the rocket transportation to space.  
CO3 : Acquire the applications of satellite communication and navigation.  
CO4 : Appreciate the applications of space technology changed human life.  
CO5 : Understand the importance of manned mission.

**UNIT I - EARTH AND ORBITING SATELLITES**

**(9)**

Basic principles -Keplerian orbits and Kepler equations. Orbital elements, from velocity and position information. Perturbation theory and applications, Data receiving and handling

**UNIT II – ROCKETS AND ROCKET PROPULSION**

**(9)**

Rockets and rocket propulsion, liquid fuels, solid fuels, Electromagnetic propulsion, Ion propulsion, Important satellite launching stations –Facilities at ISRO, NASA and ESRO Russian and Chinese facilities.

**UNIT III – SATELLITE COMMUNICATION AND GPS**

**(9)**

Earth to satellite communication, Laser communication, Satellite to satellite communication Global navigation satellite systems, Application of GPS systems.

**UNIT IV – APPLICATIONS OF SPACE TECHNOLOGY**

**(9)**

Physics of the earth's space, Solar observations in infrared, visible and X-rays, Communication satellite and applications, Earth resource monitoring, Remote sensing and others, Hubble space telescope. Military, applications, Weather satellite and applications.

**UNIT V – MANNED FLIGHTS**

**(9)**

Manned flights to moon, Manned orbiting space crafts, NASA Space shuttles, Immunology and infection in space, The ISS and application, Russian space crafts, Skylab.

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

2. Space Science and Technology by Hans Mark, John Wiley and Sons.
3. The Cambridge encyclopedia of Space, missions, applications and exploration by Verger et al, Cambridge University Press 2003

**REFERENCE BOOKS :**

1. Space environment and it's interaction with spacecraft by C. Uberoi and S.C. Chakravorty, IISc — ISRO Educational Program
2. Introduction to GPS the global positioning system by El-Rabbany, Ahmed, London: Artech house

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

[illegible]

McGraw-Hill

**15CYZ01-CHEMISTRY FOR ENGINEERS**  
(Common to all branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- Basic information and applications of chemistry in daily life.
- Imparting knowledge on basic concepts and applications of thermodynamics
- To know about the chemistry of building materials.
- To understand the concepts of phase rule and alloys
- To understand the principles and applications of photochemistry and nuclear chemistry.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

- CO6 : Identify the role and importance of chemistry in daily life.  
CO7 : Understand the thermodynamic and predict the feasibility of chemical reactions.  
CO8 : Use the modern engineering tools for building materials and their industrial applications  
CO9 : Acquire the knowledge of industrial importance of phase rule and alloys.  
CO10 : Outline the principles and applications of photochemistry and nuclear chemistry.

**UNIT I : CHEMISTRY IN DAILY LIFE**

(9)

Introduction – role and importance of chemistry in day to day life - Food additives - Fruits - vegetables - milk and egg - constituents and benefits - chemistry of soft drinks – adulterants - simple tests for the identification of adulterants in food stuffs – Fats and Oils – difference – analysis of fats and oils – saponification number – iodine number – principle and applications of green chemistry – safer solvents and auxiliaries

**UNIT II : THERMODYNAMICS**

(9)

Thermodynamic process (isothermic, isobaric, isochoric and adiabatic process) – Internal energy – First law of thermodynamics (Mathematical derivation and limitation) – Enthalpy – Second law of thermodynamics - Entropy – Entropy change of an ideal gas and problems - Free energy - work function – Gibbs Helmholtz equation (derivation - applications – Third law and zeroeth law (only statements) – Van't Hoff isotherm (derivation only)

**UNIT III : CHEMISTRY OF BUILDING MATERIALS**

(9)

Lime – classification – manufacture - properties of lime – Cement – classification – Portland cement – chemical composition – manufacture – setting and hardening – analysis of cement – concretes – weathering of concrete - special cements - gypsum – plaster of Paris – Glass – manufacture - types - properties and uses .

**UNIT IV : PHASE RULE AND ALLOYS**

(9)

Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead – silver system only).

Alloys: Introduction- Definition- Properties of alloys- significance of alloying, Functions and effect of alloying elements - ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

**UNIT V : PHOTOCHEMISTRY & NUCLEAR CHEMISTRY**

(9)

Photochemistry: Laws of photochemistry–Einstein law and Lambert- Beer Law. Quantum efficiency – determination - Photo processes – Fluorescence - Phosphorescence, Chemiluminescence and Photo-sensitization. Nuclear chemistry: Nuclear decay – Half life period – Nuclear fission and fusion – Nuclear reactors – light water nuclear power plant – Applications of radioactivity.

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co.,New Delhi , 2012.
2. Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd.,Chennai, 2015.

**REFERENCES:**

1. Dara S.S.Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2014.
2. Puri B.R., Sharma L.R. and Pathania M.S., Principles of physical chemistry, Shoban Lal Nagin Chand & Co., New Delhi
3. K. Karunakaran et al., "Engineering Chemistry", Sonavarsity, Sona College of Technology, Salem, 2014.

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Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x					x						
2	x						x					
3	x		x									
4	x		x			x						
5	x					x						

*M. G. Karunakaran*

**15CYZ02- SOIL CHEMISTRY**  
(Common to all branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVE:**

- To build fundamental knowledge and skills of the students within the different areas of soil chemistry.
- To familiarize the students with the origin of soil, properties of soil and soil forming processes.
- To identify and describe physical, chemical and biological properties of soil that affect agricultural and non-agricultural land.
- To impart basic knowledge on pesticides and fertilizers
- To understand the basic concepts of biomass energy production from wastes.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

CO1 : Gain the fundamental knowledge about soil chemistry

CO2 : Understand the properties of soil.

CO3 : Understand the impact of soil fertility in agricultural processes.

CO4 : Gain the knowledge about pesticides and fertilizers.

CO5 : Apply the knowledge to develop energy recovering technology from bio wastes.

**UNIT I : SOIL INTRODUCTION**

(9)

Soil – definition – Composition of soil - classification of soils – Soil forming rocks and minerals – Soil forming factors and processes –Chemical weathering–hydration–oxidation–reduction–hydrolysis–solution method.

**UNIT II : SOIL PROPERTIES**

(9)

Important physical properties of soil – Soil texture – bulk density – particle density and soil porosity– their importance – Ion exchange in soil – anion exchange capacity – cation exchange capacity – Soil colloids – definition – types – soil inorganic colloids –layer silicate clays – amorphous minerals

**UNIT III : SOIL FERTILITY AND BIO FERTILIZERS**

(9)

Soil organic matter – its composition and decomposition – effect of soil organic matter on soil fertility – Humus – formation of humus – maintenance of humus – Bio fertilizers – Introduction – types – importance – Nitrogen fixer – rhizobium – algal bio fertilizers – cyanobacteria.

**UNIT IV : PESTICIDES AND FERTILIZER CHEMISTRY**

(9)

Pesticides – classification – Chloro pesticides (Methoxychlor) – organophosphorus pesticides (Parathion) – carbamate pesticides (carbaryl) – Fertilizers – nitrogen fertilizers (urea, ammonium nitrate) – phosphorus fertilizers (single super phosphate, triple super phosphate) – potassium fertilizers (potassium sulphate) – NPK fertilizers (diammonium phosphate)

**UNIT V : AGRICULTURAL WASTE AS A BIOMASS**

(9)

Bioenergy from wastes – Introduction – agricultural wastes – sources – utilization as a fuel – Bio chemical conversion of organic wastes – anaerobic digestion – methane production – thermal liquefaction –liquid fuel production – sludge treatment – activated sludge process

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

1. Brady, N.C and Weil, R.R 2012. The Nature and properties of Soils (13<sup>th</sup> Ed.). Pearson Education.
2. Clair N Sawyer, Perry I. Mc Carty, Gene F Parkin, Chemistry for Environmental engineering and science, Tata Mc graw – Hill Edition, 2014.

**REFERENCES:**

1. A text book of Bio technology by S.C.Bhatia, Atlantic publishers – 2015.
2. Samuel L. Disdale, Werner L. Nelson, James D. Beaton, Soil fertility and fertilizers, 8<sup>th</sup> Edition, Pearson Publishers, 2013.
3. Biofuels from agricultural wastes and Byproducts by Hans Blascheck, Thaddeus Ezeji, Jorgen Scheffran John Wiley & Sons, 2010.

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Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x					x						
2	x						x					
3	x		x									
4	x		x			x						
5	x					x						

*M. G. S. S. S. S.*

**15CYZ03 - ORGANIC CHEMISTRY**  
(Common to all branches)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES**

- To understand the basic concepts of organic chemistry.
- To study the type of components in which organic reaction take place.
- To know the preparation of the essential organic compounds.
- To impart knowledge on synthetic routes to many types of industrially important organic compounds and their characterization.
- To gain knowledge on carbohydrates, amino acids and proteins

**COURSE OUTCOMES**

At the end of this course, the students will be able to

- CO1 : Apply knowledge of fundamental concepts of organic chemistry.  
CO2 : Gain basic principles involved in different chemical synthesis and apply them in chemical industries.  
CO3 : Outline the importance of pharmaceutical chemistry.  
CO4 : Discuss carbohydrates, amino acids and proteins.  
CO5 : Knowledge on various reaction mechanisms, preparation of organic compounds and their properties.

**UNIT I : REACTIONS AND REAGENTS**

(9)

Organometallic compounds – Grignard reagent- synthesis of different types of compounds like - alcohol - aldehyde – acid- amine - Acetoacetic ester – tautomerism – base hydrolysis – acid hydrolysis- malonic ester - cyano acetic ester – synthesis of dicarboxylic acids – oxalic acid – succinic acid.

**UNIT II : CARBOHYDRATES**

(9)

Monosaccharide - definition – classification - glucose – synthesis and chemical properties of glucose - Disaccharides - definition – classification - sucrose - synthesis and chemical properties of sucrose - Polysaccharides - definition – classification - cellulose - synthesis and chemical properties of cellulose - derivatives of cellulose.

**UNIT III : AMINO ACIDS AND PROTEINS**

(9)

Proteins – definition – classification of amino acid - synthesis of alpha amino acid– chemical properties of alpha amino acid – Proteins – classification of proteins - chemical properties of proteins - structure of proteins - denaturation of proteins – colour test of proteins.

**UNIT IV : HETEROCYCLIC COMPOUNDS**

(9)

Preparation, physical and chemical properties and uses of pyrrole –furan – thiophene- indole- pyridine – quinoline.

**UNIT V : PHARMACEUTICAL CHEMISTRY**

(9)

Synthesis of malonylurea – phenacetin – isoniazid - p-amino benzoic acid (PABA)- chloroquine – sulphanilamide.

**TOTAL (L:45) : 45 PERIODS**

**TEXT BOOKS:**

1. Morrison.R.T, & Boyd R, "Organic Chemistry" Edn., Prentice Hall India Pvt. Ltd. New Delhi, 2014
2. I.L. Finar "Organic Chemistry" Volume. 1, Sixth Edition, 2012.

**REFERENCES:**

1. Tewari. K.S, Vishnoi.N.k, Malhotra S.N., A Text Book of Organic Chemistry, Vikas publishing House Pvt. Ltd., New Delhi, 1986
2. Lakshmi. S, Pharmaceutical Chemistry First Edition (1995), Sultan Chand and Sons, New Delhi
3. P.L.Soni, A Text Book of organic Chemistry, Sultan Chand and Sons publishing Pvt. Ltd., 18<sup>th</sup> edition(1985).

### Mapping of Course Outcomes (COs) and Programme Outcomes (POs)

Mapping of COs and POs												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x					x						
2	x						x					
3	x		x									
4	x		x			x						
5	x					x						

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