S.A ENGINEERING COLLEGE, CHENNAI – 77
(An Autonomous Institution Affiliated to Anna University)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)
REGULATION-2020A
CHOICE BASED CREDIT SYSTEM
CURRICULUM AND SYLLABUS

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

- Graduates will gain in-depth domain-specific knowledge and develop a robust foundation for lifelong learning, ensuring proficiency in their field throughout their careers.
- Graduates will develop, analyze, evaluate, and deploy secure cyber-physical systems that meet desired constraints adhering ethical practices, addressing professional, societal, and environmental concerns
- Graduates shall Work competently for different sectors like academia, industry, research and development, entrepreneurship, and start-up initiator in an individual or collaborative manner utilizing interpersonal skills.
- Graduates will demonstrate competence in various sectors, including academia, industry, research and development, entrepreneurship, and start-ups effectively utilizing interpersonal skills to work collaboratively.

PROGRAM OUTCOMES (POs):

- **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- **Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- **Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

- **Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- **Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- **The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PROGRAMME SPECIFIC OUTCOMES

- Analyze, and develop computer programs in areas such as cryptography, networking, web development, database management, cloud computing, IoT and data analytics leading to excellence and excitement towards research, to provide elegant solutions to complex problems.
- Develop strategies for protecting data, resources, and assets for organizations, processes, and individuals, utilizing cybersecurity-centric skills.

MAPPING OF PROGRAM EDUCATIONAL OBECTIVES WITH PROGRAM OUTCOMES

A broad relation between the program objective and outcomes is given in the following table:

Program educational objectives	**Program outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	3	3	3	2	2	3	3	3	2	3
2	2	2	2	3	2	2	1	3	3	3	3	2
3	3	3	3	3	3	1	3	1	2	3	2	3

MAPPING OF PROGRAM SPECIFIC OBECTIVES WITH PROGRAM OUTCOMES

A broad relation between the program specific objective and outcomes is given in the following table:

Program specific objectives	**Program outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**
2	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**3**

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

A broad relation between the Course Outcomes and Program Outcomes is given in the following table

		Course Title	PROGRAMME OUTCOME(PO)											
			1	2	3	4	5	6	7	8	9	10	11	12
YEAR-I	SEMESTER-I	Technical English	-	-	-	-	-	√	√	-	√	√	√	√
		Calculus and its applications	√	√	√	√	-	-	-	-	-	-	-	-
		Applied Physics	√	√	-	-	-	-	-	-	-	-	-	-
		Engineering Chemistry	√	√	√	-	-	-	-	-	-	-	-	-
		Problem Solving and Python Programming	√	√	√	√	√	-	-	-	-	-	√	√
		Tamilar Thozhil Nutpam / Tamils and Technology												
		Physics and Chemistry Laboratory	√	√	√	√	-	-	-	-	-	-	-	-
		Problem Solving and Python Programming Laboratory	√	√	√	√	-	-	-	-	-	-	-	√
		Engineering Practices Laboratory	√	√	√	√	√	√	-	√	√	√	-	√
		Indian Constitution												
	SEMESTER-III	English for Communication	-	-	-	-	√	√	-	-	√	√	-	√
		Complex Variables and Transforms	√	√	√	-	-	-	-	-	-	-	-	-
		Material Science	√	√	-	-	-	-	-	-	-	-	-	-
		Basic Electrical, Electronics and Measurement Engineering	√	√	√	-	-	-	-	-	-	-	-	-
		Programming in C	√	√	√	√	-	-	-	-	-	-	√	√
		Tamilar Marabu/ Heritage of Tamils												
		Engineering Graphics	√	√	√	√	√	√	√	√	√	√	√	√
		Programming in C Laboratory	√	√	√	√	-	-	-	-	-	-	-	-
		Environmental Science and Engineering	√	√	√	-	-	-	√	√	√	√	-	√

		PROGRAMME OUTCOME(PO)												
		COURSE TITLE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
YEAR-III	**SEMESTER-III**	Discrete Mathematics	√	√	√	√	-	-	-	-	-	-	-	-
		Digital Principles and Computer Organization	√	√	√	√	√	√	√	√	√	√	√	√
		Data Structures	√	√	√	-	-	-	-	-	-	-	-	√
		Object Oriented Programming	√	√	√	√	√	-	-	-	√	-	-	√
		Software Engineering	√	√	√	-	√	-	-	√	√	√	√	√
		Data Structures Laboratory	√	√	√	-	-	-	-	-	√	√	-	√
		Object Oriented Programming Laboratory	√	√	√	-	√	-	-	-	√	√	-	√
		Interpersonal Skills Laboratory	√	√	√	√	√	√	√	√	√	√	√	√
	SEMESTER-IV	Statistics Techniques and Numerical Methods	√	√	√	√	-	-	-	-	-	-	-	√
		Operating Systems and Security (Lab Integrated)	√	√	√	-	-	-	-	-	-	-	-	-
		Software Security Engineering	√	√	√	√	√	-	-	-	√	√	√	√
		Database Management Systems and Security	√	√	√	√	√	-	√	-	√	√	√	√
		Cryptography and Information Security	√	√	√	√	√	-	-	-	√	-	-	√
		Universal Human Values	√	-	-	-	-	√	√	√	√	√	-	√
		Database Management Systems Laboratory	√	√	√	-	√	-	-	-	√	√	-	√
		Cryptography and Information Security Laboratory	√	√	√	√	√	-	-	-	√	√	-	√
		Employability and Soft Skills Laboratory	√	√	√	√	√	√	√	√	√	√	√	√

PROGRAMME OUTCOME(PO)														
		COURSE TITLE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
YEAR – III	**SEMESTER - V**	Computer Networks	√	√	√	-	-	-	-	-	-	-	-	-
		Internet of Things	√	√	√	-	-	-	-	-	-	-	-	√
		Distributed Systems and Cloud Computing	√	√	√	-	-	-	-	-	-	-	-	√
		Cyber Security Essentials (Lab Integrated)	√	√	√	-	-	-	-	-	-	-	-	√
		Theory of Computation	√	√	√	-	-	-	-	-	-	-	-	√
		Open Elective I												
		Computer Networks Laboratory	√	√	√	-	√	-	-	-	√	-	-	√
		Social Network Security Laboratory	√	√	√	-	√	-	-	-	√	-	-	√
	SEMESTER - VI	Cyber Forensics	√	√	√	-	√	-	√	-	√	√	√	√
		Web Application Security	√	√	√	-	√	-	-	-	-	-	-	√
		Artificial Intelligence	√	√	√	√	-	-	-	-	-	√	√	√
		Ethical Hacking	√	√	√	√	√	-	-	-	√	√	-	√
		Engineering Secure Software Systems	√	√	√	√	√				√	√	√	√
		Professional Elective I	√	√	√	√	√	√	√	√	√	√	√	√
		Cyber Forensics Laboratory	√	√	√	√	√	-	-	-	-	-	-	√
		Mini Project	-	-	-	-	√	√	√	√	√	√	√	√

PROGRAMME OUTCOME(PO)														
YEAR-IV	**SEMESTER-VIII**	**COURSE TITLE**	1	2	3	4	5	6	7	8	9	**10**	**11**	**12**
		Distributed Systems and Cloud Computing	√	√	√	√	√	-	-	-	√	√	√	√
		Principles of Management	√	√	√	√	√	-	-	-	-	-	-	-
		Cryptocurrency and Blockchain Technologies	√	√	√	-	√	-	√	√	√	√	-	√
		Machine Learning	√	√	√	-	-	-	√	√	√	√	√	√
		Open Elective II												
		Professional Elective II												
		Summer internship	√	√	√	√	√	√	√	√	√	√	√	√
		Distributed Systems and Cloud Computing Laboratory	√	√	√	√	√	-	√	-	√	√	√	√
		Project Work I	√	√	√	√	√	√	√	√	√	√	√	√
	SEMESTER–VIII	Professional Elective III												
		Professional Elective IV												
		Project Work II/Internship	√	√	√	√	√	√	√	√	√	√	√	√

PROFESSIONAL ELECTIVES

SEM	COURSE TITLE	PROGRAMME OUTCOME(PO)											
		1	2	3	4	5	6	7	8	9	10	11	12
VI	Data Encryption	√	√	√	√	√	√	√	√	√	√	√	√
	Security Assessment and Risk Analysis	√	√	√	√	-	-	√	-	-	-	-	-
	Database Security and Access Control	√	√	√								√	
	Software Testing and Automation	√	√	√									
	Operating Systems Security	√	√	√									
VII	Information Theory for Cyber Security	√	√	√									
	Storage Technologies	√	√	√								√	
	Security and Privacy in Cloud	√	√	√									
	Neural Networks and Deep Learning	√	√	√	√	√	√	√	√	√	√	√	√
	Principles of Secure Coding	√	√	√	√	√	√	-	-	-	-	-	√
VIII	Modern Cryptography	√	√	√	√	√	√			√	√	√	√
	Data Warehousing						√	√	√	√	√		√
	UI/UX Design	√	√	√		√				√	√		
	Network Security	√	√	√									√
	Security Practice	√	√	√	√	√				√	√	√	√
VIII	Steganography and Digital Watermarking	√	√	√	√	-	-	-	-	-	-	-	-
	Malware Analysis	√	√	√	√	√	√	√	-	√	√	√	√
	Digital and Mobile Forensics	√	√	√									
	DevOps	√	√	√									
	App Development	√	√	√	-	√	-	-	-	√	-	-	√

SEMESTER- I

SL.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS1101A	Technical English	HS	3	3	0	0	3
2.	MA1101A	Calculus and its applications	BS	4	3	1	0	4
3.	PH1101A	Applied Physics	BS	3	3	0	0	3
4.	CY1101A	Engineering Chemistry	BS	3	3	0	0	3
5.	CS1101A	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	TA1101A	Tamilar Thozhil Nutpam / Tamils and Technology	HSMC	1	1	0	0	1
PRACTICALS								
7.	BS1101A	Physics and Chemistry Laboratory	BS	4	0	0	4	2
8.	CS1102A	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
9.	GE1101A	Engineering Practices Laboratory	ES	4	0	0	4	2
MANDATORY COURSE								
10	CI1101A	Indian Constitution	MC	2	2	0	0	0
			TOTAL	**31**	**18**	**1**	**12**	**23**

SEMESTER-II

SL. NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS1201A	English for Communication	HS	3	3	0	0	3

2.	MA1201A	Complex Variables and Transforms	BS	4	3	1	0	4
3.	PH1201A	Materials Science	BS	3	3	0	0	3
4.	EE1202A	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
5.	CS1201A	Programming in C	ES	3	3	0	0	3
6.	TA1201A	Tamilar Marabu/ Heritage of Tamils	HSMC	1	1	0	0	1
7.	ME1201A	Engineering Graphics	ES	4	2	0	2	3
PRACTICALS								
8.	CS1203A	Programming in C Laboratory	ES	4	0	0	4	2
MANDATORY COURSE								
9.	CY1201A	Environmental Science and Engineering	MC	2	2	0	0	0
TOTAL				**27**	**20**	**1**	**6**	**22**

SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	MA1303A	Discrete Mathematics	BS	3	1	0	4	4
2	CW1301A	Digital Principle and Computer Organization	ES	3	0	0	3	3
3	CS1301A	Data Structures	PC	3	0	0	3	3
4	IT1301A	Object Oriented Programming	PC	3	0	0	3	3
5	CS1302A	Software Engineering	PC	3	0	0	3	3
PRACTICALS								
6	CS1303A	Data Structures Laboratory	PC	0	0	4	4	2
7	IT1302A	Object Oriented Programming Laboratory	PC	0	0	4	4	2
8	HS1301A	Interpersonal Skills Laboratory	EEC	0	0	2	2	1
			TOTAL	**15**	**1**	**10**	**26**	**21**

SEMESTER IV

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	**T**	**P**		
THEORY								
1	MA1408A	Statistics Techniques and Numerical Methods	BS	3	1	0	4	4

2	CB1401A	Operating Systems and Security (Lab Integrated)	PC	3	0	2	5	4
3	CB1402A	Software Security Engineering	PC	3	0	0	3	3
4	CB1403A	Database Management Systems and Security	PC	3	0	0	3	3
5	CB1404A	Cryptography and Information Security	PC	3	0	0	3	3
6.	HV1401A	Universal Human Values	ES	2	1	0	3	3
PRACTICALS								
7.	CB1405A	Database Management System and Security	PC	0	0	4	4	2
8.	CB1406A	Cryptography and Information Security Laboratory	PC	0	0	4	4	2
9.	HS1401A	Employability And Soft Skills Laboratory	EEC	2	0	0	2	1
			TOTAL	**19**	**2**	**10**	**31**	**25**

SEMESTER V

S. NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	IT1501A	Computer Networks	PC	3	0	0	3	3
2.	CB1501A	Social Network Security	PC	3	0	0	3	3
3.	CB1502A	IOT Security	PC	3	0	0	3	3
4.	CB1503A	Cyber Security Essentials (Lab Integrated)	PC	3	0	2	5	4
5.	CS1502A	Theory of Computation	PC	3	0	0	3	3
6.		Open Elective I	OE	3	0	0	3	3
PRACTICALS								
7.	IT1503A	Computer Networks Laboratory	PC	0	0	4	4	2
8.	CB1504A	Social Network Security Laboratory	PC	0	0	4	4	2
			TOTAL	**18**	**0**	**6**	**24**	**23**

SEMESTER VI

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	CB1601A	Cyber Forensics	PC	3	0	0	3	3

2.	CB1602A	Web Application Security	PC	3	0	0	3	3
3.	CS1603A	Artificial Intelligence	PC	3	0	0	3	3
4.	CB1603A	Ethical Hacking	PC	3	0	0	3	3
5.	CB1604A	Engineering Secure Software Systems	PC	3	0	0	3	3
6.		Professional Elective I	PE	3	0	0	3	3
PRACTICALS								
7.	CB1605A	Cyber Forensics Laboratory	PC	0	0	4	4	2
8.	CB1606A	Mini Project	EEC	0	0	4	4	2
			TOTAL	**18**	**0**	**8**	**26**	**22**

SEMESTER VII / VIII*

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	IT1701A	Distributed Systems and Cloud Computing	PC	3	0	0	3	3
2.	MG1701A	Principles of Management	HS	3	0	0	3	3
3.	CB1701A	Cryptocurrency and Blockchain Technologies	PC	3	0	0	3	3
4.		Open Elective – II	OE	3	0	0	3	3
5.		Professional Elective II	PE	3	0	0	3	3
PRACTICALS								
6.	CB1702A	Summer internship	EEC	0	0	0	0	2
7.	IT1702A	Distributed Systems and Cloud Computing Laboratory	PC	0	0	4	4	2
8	CB1704A	Project work I	EEC	0	0	6	6	3
		TOTAL		**15**	**0**	**10**	**25**	**22**

SEMESTER VIII /VII*

S. NO	COURE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								

1		Professional Elective III	PE	3	0	0	3	3
2		Professional Elective IV	PE	3	0	0	3	3
PRACTICALS								
3.	CB1801A	Project Work II /Internship	EEC	0	0	14	14	7
			TOTAL	**6**	**0**	**14**	**20**	**13**

TOTAL CREDITS: 171

HUMANITIES AND SOCIAL SCIENCES (HS)

	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS1101A	Technical English	HS	3	3	0	0	3
2.	HS1201A	English for Communication	HS	3	3	0	0	3

(HSMC)

	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	TA1101A	Tamilar Marabu/ Heritage of Tamils	HSMC	1	1	0	0	1
2.	TA1201A	Tamilar Thozhil Nutpam / Tamils and Technology	HSMC	1	1	0	0	1

BASIC SCIENCES (BS)

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA1101A	Calculus and its applications	BS	4	3	1	0	4
2.	PH1101A	Applied Physics	BS	3	3	0	0	3
3.	CY1101A	Engineering Chemistry	BS	3	3	0	0	3
4.	BS1101A	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA1201A	Complex Variables and Transforms	BS	4	3	1	0	4
6.	PH1201A	Material Science	BS	3	3	0	0	3
7.	MA1303A	Discrete Mathematics	BS	34	3	1	0	4
8.	MA1408A	Statistics Techniques and Numerical Methods	BS	3	3	1	0	4

ENGINEERING SCIENCES (ES)

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS1101A	Problem Solving and Python Programming	ES	3	3	0	0	3
2.	CS1102A	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
3.	GE1101A	Engineering Practices Laboratory	ES	4	0	0	4	2
4.	EE1202A	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
5.	CS1201A	Programming in C	ES	3	3	0	0	3
6.	ME1101A	Engineering Graphics	ES	4	2	0	2	3
7.	CS1203A	Programming in C Laboratory	ES	4	0	0	4	2
8.	CW1301A	Digital Principle and Computer Organization	ES	3	0	0	3	3
9.	HV1401A	Universal Human Values	ES	2	1	0	3	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS1301A	Interpersonal Skills Laboratory	EEC	2	0	0	2	1
2.	HS1401A	Employability And Soft Skills Laboratory	EEC	2	0	0	2	1
3.	CB1703A	Summer Internship	EEC	0	0	0	0	2
4.	CB1606A	Mini Project	EEC	4	0	0	4	2
5.	CB1704A	Project work – I	EEC	6	0	0	6	3
6.	CS1801A	Project Work-II	EEC	14	0	0	14	7

PROFESSIONAL CORE (PC)

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS1301A	Data Structures	PC	3	0	0	3	3
2.	IT1301A	Object Oriented Programming	PC	3	0	0	3	3
3.	CS1302A	Software Engineering	PC	3	0	0	3	3
4.	CS1303A	Data Structures	PC	0	0	4	4	2

		Laboratory						
5.	IT1302A	Object Oriented Programming Laboratory	PC	0	0	4	4	2
6.	CB1401A	Operating Systems and Security (Lab Integrated)	PC	3	0	2	5	4
7.	CB1402A	Software Security Engineering	PC	3	0	0	3	3
8.	CB1403A	Database Management Systems and Security	PC	3	0	0	3	3
9.	CB1404A	Cryptography and Information Security	PC	3	0	0	3	3
10.	CB1405A	Database Management System and Security	PC	0	0	4	4	2
11.	CB1406A	Cryptography and Information Security Laboratory	PC	0	0	4	4	2
12.	IT1501A	Computer Networks	PC	3	0	0	3	3
13.	CB1501A	Social Network Security	PC	3	0	0	3	3
14.	CB1502A	IOT	PC	3	0	0	3	3
15.	CB1503A	Cyber Security Essentials (Lab Integrated)	PC	3	0	2	5	4
16.	CS1502A	Theory of Computation	PC	3	0	0	3	3
17.	IT1503A	Computer Networks Laboratory	PC	0	0	4	4	2
18.	CB1504A	Social Network Security Laboratory	PC	0	0	4	4	2
19.	CB1601A	Cyber Forensics	PC	3	0	0	3	3
20.	CB1602A	Web Application Security	PC	3	0	0	3	3
21.	CS1603A	Artificial Intelligence	PC	3	0	0	3	3
22.	CB1603A	Ethical Hacking	PC	3	0	0	3	3
23.	CB1604A	Engineering Secure Software Systems	PC	3	0	0	3	3
24.	CB1605A	Cyber Forensics Laboratory	PC	0	0	4	4	2
25.	IT1701A	Distributed Systems and Cloud Computing	PC	3	0	0	3	3
26.	CB1701A	Cryptocurrency and Blockchain Technologies	PC	3	0	0	3	3
27.	CB1703A	Distributed Systems and Cloud Computing	PC	0	0	4	4	2

PROFESSIONAL ELECTIVES

ELECTIVE-I

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	CB1607A	Data Encryption	PE	3	3	0	0	3
2.	CB1608A	Security Assessment and Risk Analysis	PE	3	3	0	0	3
3.	CB1609A	Database Security and Access Control	PE	3	3	0	0	3
4.	CB1610A	Software Testing and Automation	PE	3	3	0	0	3
5.	CB1611A	Operating Systems Security	PE	3	3	0	0	3

ELECTIVE-II

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	CB1705A	Information Theory for Cyber Security	PE	3	3	0	0	3
2.	CB1706A	Storage Technologies	PE	3	3	0	0	3
3.	CB1707A	Security and Privacy in Cloud	PE	3	3	0	0	3
4.	CB1708A	Neural Networks and Deep Learning	PE	3	3	0	0	3
5.	CB1709A	Principles of Secure Coding	PE	3	3	0	0	3

ELECTIVE-III

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	CB1802A	Modern Cryptography	PE	3	3	0	0	3
2.	CB1803A	Data Warehousing	PE	3	3	0	0	3
3.	CB1804A	UI/UX Design	PE	3	3	0	0	3
4.	CB1805A	Network Security	PE	3	3	0	0	3
5.	CB1806A	Security Practice	PE	3	3	0	0	3

ELECTIVE-IV

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	CB1807A	Steganography and Digital Watermarking	PE	3	3	0	0	3
2.	CB1808A	Malware Analysis	PE	3	3	0	0	3
3.	CB1809A	Digital and Mobile Forensics	PE	3	3	0	0	3
4.	CB1810A	DevOps	PE	3	3	0	0	3
5.	CB1811A	App Development	PE	3	3	0	0	3

OPEN ELECTIVE OFFERED TO OTHER DEPARTMENT
OPEN ELECTIVE I
SEMESTER V

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	CB1505A	Principles of Cyber Security	OE	3	3	0	0	3
2.	CB1506A	Data Privacy	OE	3	3	0	0	3
3.	CB1507A	Data Analytics for Fraud Detection	OE	3	3	0	0	3
4.	CB1508A	Cloud Security	OE	3	3	0	0	3

OPEN ELECTIVE II
SEMESTER VII

Sl.NO.	SUBJECT CODE	SUBJECT	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY:								
1.	CB1704A	Web Security	OE	3	3	0	0	3
2.	CB1705A	Cloud Security	OE	3	3	0	0	3
3.	CB1706A	Blockchain Technologies	OE	3	3	0	0	3
4.	CB1707A	Security Practices	OE	3	3	0	0	3

SUMMARY

SL. NO	Subject Area	Credits per semester								Credits Total	Percentage
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	3	3	4						10	5.9
2.	BS	15	7		4					26	15.38
3.	ES	7	11	3	3					24	14.2
4.	PC			13	17	20	17	8		75	44.3
5.	PE						3	3	6	12	7.1
6.	OE					3		3		6	3.6
7.	EEC			1	1		2	5	7	16	9.5
8.	MC	0								0	0
9.	HSMC	1	1							2	1.2
TOTAL										171	

HS1101A **TECHNICAL ENGLISH**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Nurture their ability in technical writing like to prepare professional job applications and effective reports.
- Develop their speaking skills by participating in various speaking activities.
- Strengthen their listening skill to comprehend lectures and talks in their areas of specialization.
- Improve their ability to explicit their excellence in all modes of technical communication.

UNIT I **9**

Reading- Reading short texts Listening- Listening to different formal / informal conversations Writing- Instructions, Jumbled sentences Speaking- Self introduction Language development- Parts of speech, Prepositions Vocabulary development- Word formation- root words from foreign language and their use in English.

UNIT II **9**

Reading-Skimming and Scanning to find specific information Listening- Listening to INK talks Writing- Job Application – cover letter, resume writing Speaking- Asking and Giving directions Language development- Conjunctions, Types of Nouns Vocabulary development- Prefixes and Suffixes.

UNIT III **9**

Reading- Reading for predicting the content Listening- Listening to situational short talks Writing- Types of paragraphs- Descriptive/Analytical/ compare and contrast Speaking- Mini presentations, Expressing greeting and thanks Language development- Adjectives, Numerical Adjectives, Conditional Clauses Vocabulary development- Homophones, Homonyms.

UNIT IV **9**

Reading- Practice in speed reading Listening- Listening to short texts and fill the data Writing- Interpretation of Graphics / Information, Note making Speaking-Contributing for Group Discussion Language development- Active, Passive, Impersonal passive voice Vocabulary development- Definitions, Nominal Compounds.

UNIT V **9**

Reading- Reading short stories Listening- Listening for note taking Writing- Report writing, E-mail Writing Speaking- Picture descriptions, Speaking in familiar situations Language development- Tenses Vocabulary development- British and American Vocabulary.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Exhibit the memory of the previously learnt grammatical concepts and apply them in technical contexts.
- Indicate the professional proficiency by preparing the formal correspondence with global standards.
- Infer information and interrelate the technical and general texts.

- Relate verbal and technical information concisely with coherence and cohesion.
- Identify and construct appropriate statements representing the global situations.

TEXT BOOKS:

1. Richards, C. Jack. Interchange Students' Book-2 New Delhi: CUP, 2015.
2. Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016.

REFERENCES:

1. Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge, 2011.
2. Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011
3. Darlene Smith-Worthington, Sue Jefferson, Technical writing for Success, South-Western Cengage Learning,USA-2011
4. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007
5. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice. Oxford University Press: New Delhi, 2014
6. Swan Michael, Practical English Usage. Oxford University Press, Eighth impression 2002.

Recommended Websites

bbc.co.uk/1learning english
oxfordonlineenglish.com/
cambridgeenglish.org
inktalks.com/talks/
manageyourwriting.com

MA1101A **CALCULUS AND ITS APPLICATIONS** **L T P C**
3 1 0 4

COURSE OBJECTIVES:

- To understand the concepts of limits, continuity, differentiation and use it to find maxima and minima of functions of one variable.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations of first and second order that model in various engineering problems.
- To familiarize the student with functions of several variables that is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS **12**

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

UNIT II ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER WITH APPLICATIONS

Basic concepts- Separable differential equations - Exact differential equations - Integrating factors - Linear differential equations - Bernoulli's equation - Geometric Applications- Orthogonal trajectories - Physical Applications - Simple electronic circuits-Newton law of cooling-Heat flow-Rate of decay of radioactive materials-Chemical reaction and solutions.

UNIT III DIFFERENTIAL EQUATIONS **12**

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

UNIT IV FUNCTIONS OF SEVERAL VARIABLES **12**

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

UNIT V MULTIPLE INTEGRALS **12**

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

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Acquire the basic concepts of differentiation rules to find the maxima and minima for function of one variable.
- Attain the knowledge of basic application problems involved in first order differential equation.
- Compute the solution of second order linear differential equations with constant coefficients.
- Explore the concept of ordinary derivatives into partial derivatives and apply them to find extreme values of the functions of two variables and series approximation of the function of two variables.
- Identify the double and Triple integration techniques over a region in two dimensional and three-dimensional geometry.

TEXTBOOKS:

1. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2016.

2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2016.

REFERENCES:

1. Bali,N.P., Goyal,M.,Watkins,C.,Advanced Engineering Mathematics, Laxmi Publications Pvt. Limited, 2007.
2. Boyce,W.E.,andDiPrima,R.C., Elementary Differential Equations and Boundary Value Problems, Wiley India, 2012.
3. O'Neil. P. V., "Advanced Engineering Mathematics", 7th Edition, Cengage Learning India Pvt., Ltd, New Delhi, 2011.
4. T.Veerarajan, Engineering Mathematics, Mc Grawhill Publications, New Delhi 2017.

PH1101A APPLIED PHYSICS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I PROPERTIES OF MATTER **9**

Elasticity- plasticity – Different Types of Stress and Strain- concept of stress-strain diagram and its application - three types of modulus of elasticity- Poisson's Ratio – Bending of beams- Expression for bending moment –- young's modulus uniform and Non uniform bending : Theory and Experiment – I Shape girders – Torsional oscillation Theory and Experiment- Application of Elastic Materials.

UNIT II APPLIED OPTICS **9**

Laser : characteristics of laser - Principle of spontaneous emission and stimulated emission – Laser action – Einstein A & B coefficients - Population inversion - Pumping – Basic requirement of laser – Types of laser : Nd-YAG and CO_2 – Applications : Welding , Drilling & Cutting – Medical field Fiber optics: Introduction- Principle and propagation of light – Numerical aperture and acceptance angle – classification of optical fibers – Losses in optical fibers(Qualitative) – Fiber optics communication system (Block Diagram) – Advantages with fiber optic communication system.

UNIT III THERMAL PHYSICS **9**

Modes of heat transfer- thermal conduction, convection and radiation – Specific heat capacity- thermal conductivity- Newton's law of cooling - Searle's and Lee's disc methods: theory and experiment - conduction through compound media (series and parallel) – thermal expansion of solids, liquids and gases - Applications: heat exchangers, refrigerators and solar water heaters.

UNIT IV WAVE AND PARTICLE PHYSICS **9**

Inadequacy of Classical Mechanics - Development of quantum theory- Planck's Black body radiation and Distribution Laws(Qualitative) – Compton Effect (Derivation) - De Broglie wavelength – properties of matter waves – Experimental Verification (G.P Thomson experiment) – Heisenberg's uncertainty principle - Schrodinger's wave equation – time dependent – time independent wave equations – physical significance of Wave function – applications: particle in a one dimensional potential box**.**

UNIT V CRYSTALOGRAPHY **9**

Single crystalline, polycrystalline and amorphous materials Lattice - unit cell- Crystal systems- Bravais lattices- Lattice planes- Miller indices- Interplanar- d- Spacing in cubic Lattice- calculation of number of atoms per unit cell – atomic radius – packing factor for SC, BCC, FCC and HCP structures- Crystal Defects – types.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- The students will gain knowledge on the basics of properties of matter and its applications
- Use the concepts of waves and optical devices and their applications in Laser and fiber optics
- The students will understand the properties of thermal materials and its applications
- The students will get knowledge on advanced physics concepts of quantum theory and its application in one dimensional box
- The students will understand the different types of crystals structures and different crystal growth techniques.

TEXT BOOKS:

1. Gupta S.L. and Sanjeev Gupta, Modern Engineering Physics, Dhanpat Rai Publishers, 2015.
2. R. K. Gaur and S.C. Gupta, Engineering Physics, Dhanpat Rai Publication (P) Ltd, New Delhi, 2014.
3. Bhattacharya, D.K. and Poonam, T. Engineering Physics, Oxford University Press, 2015.

REFERENCES:

1. C. Kittel , Introduction to Solid State Physics 8th Edition , Wiley Eastern Ltd,2004.
2. Halliday, D., Resnick, R. and Walker, J. Principles of Physics. Wiley, 2015.
3. Tipler, P.A. and Mosca, G. Physics for Scientists and Engineers with Modern Physics, W.H.Freeman, 2007.
4. Einstein coefficient calculation,https://youtu.be/TvfiZHXUtXg(Video lecture)
5. Lattice structures, https://youtu.be/Rm-i1c7zr6Q(Video lecture)

CY1101A ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- To develop an understanding of the basic concepts of phase rule and its applications to single and Two component systems and appreciate the purpose and significance of alloys.
- It enables the students to gain information about Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells
- It deals with the information about the types of fuels, calorific value calculations and manufacture of solid, liquid and gaseous fuels.
- To impart knowledge about the nano materials synthesis, properties and applications

UNIT I WATER TREATMENT AND TECHNOLOGY **9**

Introduction – characteristics, Water quality parameters -hardness– types, Determination-EDTA method, Alkalinity ,boiler feed water requirements-boiler troubles – scale & sludge -Caustic Embrittlement, boiler explosion -softening of hard water - external treatment process - demineralization and zeolite, internal treatment - boiler compounds (phosphate, calgon, carbonate and colloidal conditioning methods) – desalination of brackish water –reverse osmosis.

UNIT II PHASE RULE AND ALLOYS **9**

Phase rule: Introduction, definition of terms with examples, One Component System- water system,Sulphur,CO2 system, Thermal Analysis and cooling curves, Reduced phase rule - Two Component Systems- classification – lead-silver system-problems. 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.

UNIT III ENERGY SOURCES AND STORAGE DEVICES **9**

Energy – Types – Non-renewable energy - Nuclear energy -renewable energy - solar energy conversion - solar cells. Introduction to Electrochemistry, Nernst Equation-Electrochemical cells – reversible and irreversible cells –Cell construction and representation - Batteries -types of batteries – characteristics – construction and working of primary battery (dry cell) - secondary battery(lithium-ion-battery) - fuel cells (H2-O2).

UNIT IV FUELS AND COMBUSTION **9**

Fuel: Introduction- classification of fuels- calorific value- higher and lower calorific values- coal- analysis of coal (proximate and ultimate)- carbonization- manufacture of metallurgical coke (Otto Hoffmann method) – petroleum- manufacture of synthetic petrol (Bergius process)- knocking- octane number – diesel oil- cetane number – natural gas- compressed natural gas(CNG)- liquefied petroleum gases(LPG) producer of fuels: introduction- theoretical calculation of calorific value- ignition temperature- explosive range – flue gas analysis (ORSAT Method).

UNIT V NANOCHEMISTRY **9**

Basics - distinction between nanoparticles and bulk materials; size- dependent properties, Nano cluster, Nano rod, nanotube(CNT)-Types of CNT and nanowire. Synthesis: precipitation, thermolysis, chemical vapour deposition, Properties, Characterization and applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Explain the hardness of water, related problems and its treatment.
- Apply phase rule to construct phase diagram and predict the low melting alloys.
- Illustrate conventional and non-conventional energy sources and basics of electrochemistry, Types of batteries, their reactions and the importance.
- Explain various fuels and its applications based on its calorific value.
- Comprehend the basics, types, preparation methods and recent trends in nanomaterial.

TEXT BOOKS:

1. Jain P.C. and Monica Jain, “Engineering Chemistry”, DhanpatRai Publishing Company (P) Ltd., New Delhi, 2010.

REFERENCES:

1. Dara S.S, Umare S.S, “Engineering Chemistry”, S. Chand & Company Ltd., New Delhi 2010
2. Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.
3. Ozin G. A. and Arsenault A. C., “Nanochemistry: A Chemical Approach to Nanomaterials”, RSC Publishing, 2005.

CS1101A PROBLEM SOLVING AND PYTHON PROGRAMMING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To know the basics of algorithmic problem solving

- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures –- lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I ALGORITHMIC PROBLEM SOLVING **9**

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards and guess an integer number in a range, Towers of Hanoi.

UNIT II DATA EXPRESSIONS, STATEMENTS **9**

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

UNIT III CONTROL FLOW, FUNCTIONS **9**

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

UNIT IV LISTS, TUPLES, DICTIONARIES **9**

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

UNIT V FILES, MODULES, PACKAGES &TURTLE **9**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file- Case study: Simple Graphics using Turtle: Draw a Random Pattern of Circle, Square and Rectangle; Draw a Pattern of Straight Lines, Plotting Graphs in Python: Menu Driven Program to Create Mathematical 3D Objects.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Understand the basic of algorithmic problem solving.
- Illustrate Python programs with data expressions and statements.
- Apply Python control flow and python functions
- Apply Python data structures like list, tuples and dictionaries.
- Implement file concepts to read and write data from/to files.

TEXT BOOKS:

1. Allen B. Downey, `Think Python: How to Think Like a Computer Scientist', 2nd edition, Updated for Python Shr off/ O'Reilly Publishers, 2016(http://greenteapress.com/wp/thinkpython/)
2. Reema Thareja, Problem Solving and Programming with python, 2nd edition, Oxford University press, 2019.
3. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press, 2013.
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.

TA1101A	**TAMILAR THOZHIL NUTPAM/TAMILS AND TECHNOLOGY**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

UNIT I WEAVING AND CERAMIC TECHNOLOGY **3**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY **3**

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period

UNIT III MANUFACTURING TECHNOLOGY **3**

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and gold-Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY **3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry-Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING **3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலொறு – மக்களும் பண் பொடும் – மக.மக. பிள்மள (தவளியீடு: தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முமனவர்இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – மவமக நதிக்கமரயில் ெங்ககொல நகர நொகரிகம் (ததொல்லியல் துமற தவளியீடு)
4. தபொருமந – ஆற்றங்கமர நொகரிகம். (ததொல்லியல் துமற தவளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

BS1101A PHYSICS AND CHEMISTRY LABORATORY

L	T	P	C
0	0	4	2

PHYSICS LABORATORY

COURSE OBJECTIVES:

- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)

1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young's modulus by non-uniform bending method
3. Determination of wavelength, and particle size using Laser
4. Determination of acceptance angle in an optical fiber.
5. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
6. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
7. Determination of wavelength of mercury spectrum – spectrometer grating
8. Determination of band gap of a semiconductor
9. Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

CHEMISTRY LABORATORY

COURSE OBJECTIVES:

- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.

LIST OF EXPERIMENTS (Any seven experiments to be conducted)

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of TDS of water sample.

5. Determination of strength of acids in a mixture of acids using conductivity meter.
6. Estimation of iron content of the given solution using potentiometer.
7. Estimation of iron content of the water sample using spectrophotometer (1, 10- Phenanthroline / thiocyanate method).
8. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
9. Conductometric titration of strong acid vs strong base.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

- Understand and apply fundamental concepts of mechanical properties analysis.
- Understand the fundamental principles of acoustic properties, and learn about semiconductor properties.
- Understand and learn about the fundamental principles of optical properties analysis.
- Apply hands-on knowledge in the quantitative chemical analysis of water.
- Carry out the basics of instrumental analysis-conductivity meter, and potentiometer.

PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

CS1102A	L	T	P	C
	0	0	4	2

COURSE OBJECTIVES:

- To study python programs with conditionals and loops
- To use functions for python structured programs.
- Use strings for structuring Python programs.
- Represent compound data using Python lists, tuples and dictionaries.
- To read and write data from and to files in python.

LIST OF EXPERIMENTS:

1. Write a program to display the largest number among three numbers.
2. Write a program to display the Fibonacci series by using looping constructs.
3. Write a function to compute the GCD of two numbers.
4. Explore String Functions
5. With the help of strings, array or list, display a simple calendar in python program without using the calendar module.
6. With the help of list perform linear search and Binary search.
7. Write a program to perform Selection sort, Insertion sort, Merge sort
8. Create a text file using python file I/O. Read the content of the file and change them from lower to upper case characters.
9. Programs that take command line arguments (word count)
10. Find the most frequent words in a text read from a file
11. Simulate bouncing ball using Pygame

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals

SOFTWARE: Python 3 interpreter for Windows/Linux

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course the student should be able to

- Design simple programs using conditionals and loops.

- Implement functions to solve mathematical problems.
- Use strings for structuring Python programs.
- Summarize compound data using Python lists, tuples, and dictionaries.
- Implement file concepts to write programs to read and write datas.

GE1101A ENGINEERING PRACTICES LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I CIVIL ENGINEERING PRACTICE 13 Buildings:

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

Plumbing Works:

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

Carpentry using Power Tools only:

- Study of the joints in roofs, doors, windows and furniture.
- Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

II MECHANICAL ENGINEERING PRACTICE 18

Welding:

- Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
- Gas welding practice

Basic Machining:

- Simple Turning and Taper turning
- Drilling Practice

Sheet Metal Work:

- Forming & Bending:
- Model making – Trays and funnels.

- Different type of joints.

Machine assembly practice:

- Study of centrifugal pump
- Study of air conditioner

Demonstration on:

- Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
- Foundry operations like mould preparation for gear and step cone pulley. (c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP -B (ELECTRICAL & ELECTRONICS)

III ELECTRICAL ENGINEERING PRACTICE 13

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

IV ELECTRONICS ENGINEERING PRACTICE 16

- Study of Electronic components and equipments – Resistor, colour coding measurement of AC Signal parameter (peak-peak, rms period, frequency) using CR.
- Study of logic gates AND, OR, EX-OR and NOT.
- Generation of Clock Signal.
- Soldering practice – Components Devices and Circuits – Using general purpose PCB. 5. Measurement of ripple factor of HWR and FWR.

TOTAL PERIODS : 60

COURS OUTCOMES:

On successful completion of this course, the student will be able to

- Fabricate carpentry components and pipe connections including plumbing works.

- Use welding equipments to join the structures.
- Carry out the basic machining operations
- Make the models using sheet metal works
- Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings 6. Carry out basic home electrical works and appliances
- Measure the electrical quantities
- Elaborate on the components, gates, soldering practices.

CI1101A **INDIAN CONSTITUTION**

L	T	P	C
2	0	0	0

Prerequisites: Basic law.

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India have played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

HS1201A **ENGLISH FOR COMMUNICATION**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- Improve their language ability to improve the four basic skills of communication (LSRW).
- Enhance the skills and methods to enrich their reading and comprehending ability.
- Strengthen their skills to listen to the lectures and talks related to their fields of studies.
- Foster their ability to write effectively in all contexts.
- Cultivate their oral presentation skills through technical presentations and contribution in group discussions.

UNIT I **9**

Reading- Reading for detailed comparison Listening- Listening to interviews Writing- Developing hints, summarizing Speaking- Talk about future plans, arrangements intensions Language development- Sentence structures Vocabulary development- Synonyms, Antonyms, Adverbs

UNIT II **9**

Reading-Extended reading Listening- Listening to telephonic conversations Writing- Formal Letter Writing - Letters for bona fide certificate - to the principal for permission for in plant training, industrial visit, paper presentations, inter college events, Letter to the Editor, Recommendations Speaking- Formal conversation Language development-Use of Punctuation, Modal verbs Vocabulary development- One word substitutes, Common Phrasal verbs

UNIT III **9**

Reading- Identify topic sentences by reading a passage Listening- Listening to TED talks Writing- Process/product description Speaking- Formal Conversations Language development-Relative Clauses, Concord, Error correction Vocabulary development- Idioms & Phrases, Minimal pair.

UNIT IV **9**

Reading- Reading newspaper articles Listening- Listening to inspirational speeches Writing- Essays, Checklist Speaking- Technical Presentations Language development- Degrees of Comparison Vocabulary development- Articles, Cause and Effect Expressions

UNIT V **9**

Reading- Close reading Listening- Listening for summarizing Writing- Dialogue conversations Speaking- Movie/ Book Review Language development- Wh Questions, Yes/ no Questions Vocabulary development- Foreign Expressions and its applications, Reference words

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Sketch brief technical and general texts using appropriate diction.
- Express various styles of drafts in formal and informal contents.
- Inter relate the verbal and technical skills in the given technical contexts.
- Construct meaningful utterances to present intense technical knowledge.
- Interpret key ideas by reviewing lexicon across the language in syntactical contexts.

REFERENCES:

1. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014
2. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
3. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015
4. Dutt P. Kiranmai and Rajeevan Geeta. Basic Communication Skills, Foundation Books: 2013
5. Means,L. Thomas and Elaine Langlois. English & Communication for Colleges. Cengage Learning
   USA: 2007.

RECCOMENDED WEBSITES:
TED.com
learningenglish.voanews.com
islcollective.com
examenglish.com
englishclass101.com

MA1201A COMPLEX VARIABLES AND TRANSFORMS

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

COURSE OBJECTIVES:

- Understand the concept of Divergence and curl and use it in evaluating Line, Surface and Volume integrals.
- Understand C-R equations and use it in the construction of Analytic Functions.
- Understand the methods of Complex Integration using Cauchy's Integral Formula and Cauchy Residue theorem, finding Taylor's and Laurent's Series expansions.
- Find the Laplace Transforms of standard Functions and to find the Inverse Laplace Transform of a function and use it in solving Differential Equations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems

UNIT I VECTOR CALCULUS **12**

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

UNIT II ANALYTIC FUNCTIONS **12**

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping – Mapping by functions (w 1 z , wz^2, we^z, w sinhz, w coshz) – Bilinear transformation.

UNIT III COMPLEX INTEGRATION. **12**

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

UNIT IV LAPLACE TRANSFORMS **12**

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

UNIT V Z - TRANSFORMS AND DIFFERENCE EQUATIONS **12**

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

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Understanding the concept of divergence and curl to calculate the line, surface and volume integrals using vector integration.
- Solve the problems under analytic functions and construction of analytic function using C-R equation.

- Classify the singularities and pole, find residues and evaluate complex integrals using residue theorem.
- Understand the concepts of Laplace Transforms and its properties and to solve the differential equations.
- Using the properties of Z-transform and solve the difference equation.

TEXTBOOKS:

1. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2016.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2016.

REFERENCES:

1. Bali,N.P.,Goyal,M.,Watkins,C.,AdvancedEngineeringMathematics,Laxmi Publications Pvt. Limited, 2007.
2. Boyce,W.E.,and DiPrima, R.C.,Elementary Differential Equation sand Boundary Value Problems, Wiley India, 2012.
3. O'Neil. P. V."Advanced Engineering Mathematics", 7th Edition, Cengage Learning India Pvt., Ltd, New Delhi, 2011.
4. 4.T. Veerarajan, Engineering Mathematics, Tata Mcgraw Hill publications co. ltd, New Delhi.2017.

PH1201A MATERIAL SCIENCE

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To enrich the understanding of various types of materials and their applications in engineering and technology.

UNIT I CONDUCTING MATERIALS **9**

Conductors – classical free electron theory of metals – Electrical and thermal conductivity –Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory –Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states –carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS **9**

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination –Elemental and Compound Semiconductors – N-type and P-type semiconductor (Qualitative) – Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS **9**

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism –Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials –Ferrites and its applications. Electro static Discharge (ESD)-Superconductivity: properties – Type I and Type II superconductors–BCS theory of superconductivity (Qualitative) - High Tc superconductors – Electrical, medical, magnetic and computer application of superconductors.

UNIT IV DIELECTRIC MATERIALS **9**

Electrical susceptibility – dielectric constant – electronic, ionic, orientation and space charge polarization – frequency and temperature dependence of polarisation – Clausius mosotti relation - dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer).

UNIT V ADVANCED ENGINEERING MATERIALS **9**

Metallic glasses - melt spinning process, applications - shape memory alloys: Ni-Ti alloy, applications – nano materials: preparation (bottom up and top down approaches), properties and applications- Bio materials – introduction- properties of bio materials-examples- medical applications- Ophthalmology- bio sensors- characteristics.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students would:

- Understand the fundamental principles of conducting materials and analyze their behavior under varying temperature conditions.
- Gain knowledge on semiconductor physics, including carrier concentration, and apply it to the design and analysis of semiconductor devices.
- Understand the properties of magnetic and superconducting materials, and apply their concepts in practical engineering systems
- Gain knowledge on polarization mechanisms in dielectric materials and its applications
- Understand the properties and applications of advanced nano materials and biomaterials for various engineering applications.

TEXT BOOKS:

1. S.Mohan, Principles of Materials Science, MJP Publishers, 2018.
2. Jasprit Singh, Semiconductor Devices, Basic Principles, Wiley 2012.
3. Umesh K Mishra and Jasprit Singh, Semiconductor Device Physics and Design‖, Springer, 2008.

REFERENCES:

1. Wahab, M.A. Solid State Physics: Structure and Properties of Materials‖, Narosa Publishing House, 2009.
2. William D.Callister Jr, David G. Rethwisch, Materials Science and Engineering, An Introduction, Wiley India (P) Ltd., 8th Edition, 2009.
3. Pillai S.O., Solid State Physics, New Age International (P) Ltd., Publishers, 2009.
4. Semiconductor Introduction, https://youtu.be/k6ZxP9Yr02E(Video lecture)
5. Superconductivity, https://youtu.be/D-9M3GWOBrw(Video lecture)

EE1202A BASIC ELECTRICAL, ELECTRONICS & MEASUREMENT ENGINEERING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To learn the fundamental laws, theorems of electrical circuits and also to analyze them
- To study the basic principles of electrical machines and their performance
- To study the different energy sources, protective devices and their field applications
- To understand the fundamentals of electronic circuit constructions
- To understand the principles and operation of measuring instruments and transducers

UNIT I ELECTRICAL CIRCUITS ANALYSIS 9

Ohms Law, Kirchhoff‘s Law-Instantaneous power- series and parallel circuit analysis with resistive, capacitive and inductive network - nodal analysis, mesh analysis- network theorems –Thevenin’s theorem, Norton theorem and superposition theorem, three phase supply-Instantaneous, Reactive and apparent power-star delta conversion.

UNIT II ELECTRICAL MACHINES 9

DC and AC rotating machines: Types, Construction, principle, Emf and torque equation, application - Speed Control- Basics of Stepper Motor – Brushless DC motors- Transformers-Introduction- types and construction, working principle of Ideal transformer-Emf equation

UNIT III UTILIZATION OF ELECTRICAL POWER **9**

Overview of "Renewable Energy Sources". (Wind and Solar). Illumination by lamps- Energy Saving lamps (Compact Fluorescent Lamp, Cold Cathode Tube, LED bulbs). Domestic refrigerator and air conditioner-Electric circuit, construction and working principle. Li-Ion Battery's Operation & Maintenance. Protection-need for earthing, fuses and circuit breakers – MCB, RCB and ELCB. Energy Tariff calculation for domestic loads.

UNIT IV ELECTRONIC CIRCUITS **9**

Introduction to Electron Devices – PN Junction diode, Zener Diode, Transistor)-. Op-amps- Amplifiers, differentiator, integrator, ADC, DAC. Multi vibrator using 555 Timer IC. Voltage regulator IC using LM 723, LM 317.

UNIT V ELECTRICAL MEASUREMENT **9**

Characteristics of measurement-errors in measurement, torque in indicating instruments- moving coil and moving iron meters, Energy meter and watt meter. Transducers- classification- RTD, Strain gauge, LVDT, LDR and piezoelectric. Functional Block diagram of DSO

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students would:

- Understand and analyse the fundamental laws & electrical network theorems
- Gain knowledge on DC & AC static and rotating machines
- Gain knowledge on renewable energy sources, various electrical protective devices
- To understand the fundamentals of electronic circuits
- To gain knowledge on the working principle & operation of measuring instruments and transducers

TEXT BOOKS:

1. D.P. Kothari and I.J Nagrath, Basic Electrical and Electronics Engineering, McGraw Hill, 2016, Third Edition.
2. M.S. Sukhija and T.K. Nagsarkar, Basic Electrical and Electronic Engineering, Oxford, 2016.

REFERENCES:

1. S.B. LalSeksena and Kaustuv Dasgupta, fundaments of Electrical Engineering, Cambridge,2016.
2. B.L. Theraja, Fundamentals of Electrical Engineering and Electronics, Chand & Co, 2008.
3. S.K.Sahdev, Basic of Electrical Engineering, Pearson 2015.
4. John Bird,-Electrical and electronic principles and Technology, Fourth Edition, Elsevier, 2010.
5. Mittle, Mittal, Basic Electrical Engineering, 2nd edition, Tata McGraw-Hill Edition, 2016.
6. C.L.Wadhwa, "Generation, Distribution and utilization of Electrical Energy", New Age international pvt ltd .2003.

CS1201A PROGRAMMING IN C

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To develop C Programs using basic programming constructs.
- To develop C programs using arrays and strings.
- To develop applications in C using functions and pointers.
- To develop applications in C using structures.
- To do input/output and file handling in C.

UNIT I BASICS OF C PROGRAMMING **9**

Introduction to programming paradigms - Structure of C program - C programming: Identifiers-Keywords-Data Types - Variables - Constants. Operators: Precedence and Associativity - Expressions-

Input/ Output statements - Decision making statements - Switch statement - Looping statements - Pre-processor directives - Compilation process

UNIT II ARRAYS AND STRINGS **9**

Introduction to Arrays: Declaration, Initialization - One dimensional array - Example Program: Computing Mean, Median and Mode - Two dimensional arrays - Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) - String- String operations – String Arrays.

UNIT III FUNCTIONS AND POINTERS **9**

Introduction to functions: Function prototype,-function definition,- function call,- Built- in functions (string functions, math functions) - Recursion-Types of Recursion - Example Program: Computation of Sine series, Scientific calculator using built-in functions, Binary Search using recursive functions-Storage Classes - Pointers - Pointer operators - Null Pointers-Pointer arithmetic - Arrays and pointers - Array of pointers - Example Program: Sorting of names - Parameter passing: Pass by value, Pass by reference- Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

UNIT IV STRUCTURES **9**

Structures-Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure – Passing structures to functions – Array of structures – Pointers to structures – Union - Programs using structures and Unions, Enumerated data type-Dynamic Memory Allocation.

UNIT V FILEPROCESSING **9**

Files-Types of file processing: Sequential access, Random access- Sequential access file - Example Program: Finding average of numbers stored in sequential access file - Random access file - Example Program: Payroll System and Transaction processing using random access files - Command line arguments

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students would:

- "Understand the basic syntax and semantics of the programming language constructs"
- "Develop derived data types like arrays in solving problem"
- Solve a problem into modules and reconstruct it using various ways of user-defined functions
- Develop user-defined data types like structures and unions and its applications to solve problems.
- Design applications using sequential and random-access file processing.

TEXTBOOKS:

1. Reema Thareja,"Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education,2006

REFERENCES:

1. Paul Deitel and Harvey Deitel,"C How to Program", Seventh editin, Pearson Publication
2. Juneja,B.L and Anita Seth ,"Programming in C",CENGAGE Learning India pvt.Ltd., 2011
3. Pradip Dey ,Manas Ghosh, "Fundamentals of Computing and Programming in C" ,First Edition,OxfordUniversityPress,2009.
4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley(India)Pvt.Ltd.,PearsonEducationinSouthAsia,2011.
5. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996. C", ,McGraw-HillEducation,1996.

TA1201A **TAMILAR MARABU/HERITAGE OF TAMILS**

L	T	P	C
1	0	0	1

UNIT I LANGUAGE AND LITERATURE **3**

Language Families in India - Dravidian Languages – Tamil as aClassical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE **3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS **3**

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils

UNIT IV THINAI CONCEPT OF TAMILS **3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE **3**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலொறு – மக்களும் பண் பொடும் – மக.மக. பிள்மள (தவளியீடு:
   தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முமனவர்இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – மவமக நதிக்கமரயில் ெங்ககொல நகர நொகரிகம் (ததொல்லியல் துமற தவளியீடு)
4. தபொருமந – ஆற்றங்கமர நொகரிகம். (ததொல்லியல் துமற தவளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - ‘Sangam City C ivilization on the banks of river Vaigai’ (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation,Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL– Reference Book.

ME1201A	ENGINEERING GRAPHICS	L	T	P	C
		2	0	2	3

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination) 1

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

UNIT I PLANE CURVES AND ORTHOGRAPHIC PROJECTIONS 6+6

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization principles – Layout of views- Orthographic projection of multiple views(Free Hand Sketching) from pictorial views of objects Principal planes-Projection of points-Demo using CAD software for above topics.

UNIT II PROJECTION OF POINTS STRAIGHT LINES AND PLANE SURFACES 6+6

Orthographic projections-principles-Principal planes-First angle projection-Projection of points-Projection of straight lines (only First angle projections) inclined to one of the principal planes - Determination of true lengths and true inclinations - Projection of planes (polygonal and circular surfaces) inclined to one of the principal planes - Demo using CAD software for above topics.

UNIT III PROJECTION OF SOLIDS 6+6

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method-Demo using CAD software for above topics.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 6+6

Sectioning of above solids in simple vertical position - the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones-Demo using CAD software for above topics.

UNITV ISOMETRIC ANDPERSPECTIVEPROJECTIONS 6+6

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions –Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method-Demo using CAD software for above topics.

TOTAL PERIODS:61

COURSE OUTCOMES:

On successful completion of this course, the student will be able to

- Familiarize with the fundamentals and standards of Engineering graphics.
- Perform freehand sketching of basic geometrical constructions and multiple views of objects.
- Project orthographic projections of lines and plane surfaces.
- Draw projections of solids and development of surfaces. Visualize and to project isometric and perspective sections of simple solids.

TEXT BOOK:

- NatrajanK.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers,Chennai,2009.
- Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

REFERENCES:

- Bhatt N.D. andPanchalV.M., "Engineering Drawing", Charotar
- Publishing House, 50th Edition,2010.
- Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi,2008.
- Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores,Bangalore,2007.
- Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi,2005.
- N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, NewDelhi, 2015.
- Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition,2009.

Publication of Bureau of Indian Standards:

- IS 10711 – 2001: Technical products Documentation – Size and lay
- out of drawing sheets.
- IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation– Lettering. 3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technicaldrawings. 4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of TechnicalDrawings. 5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – ProjectionMethods.

Special points applicable to University Examinations on Engineering Graphics:

- There will be five questions, each of either-or type covering all units of thesyllabus. 2. All questions will carry equal marks of 20 each making atotalof100. 3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution withinA3size. The examination will be conducted in appropriate sessions on the sameday

CS1203A	PROGRAMMING IN C LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

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

LIST OF EXPERIMENTS

1. **Input and Output statements.**
2. **Control statements – Branching &Looping.**
   - Write a C program to generate Pascal's triangle.
   - Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*,/,% and use Switch Statement)
   - Write a C program to find the sum of individual digits of a positive integer.
   - A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.
   - Write a C program to generate the first n terms of the sequence.
   - Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
   - Write a C program to swap Numbers Using Temporary Variables.
3. **Arrays**
   - Write a C program to search an array element using linear search.
   - Write a C program to find both the largest and smallest number in a list of integers.
   - Write a C program that uses functions to perform the following:
   - Addition of Two Matrices
   - Multiplication of Two Matrices
   - Write a C program to implement Bubble Sort.

4.Strings

- Write a C program that uses functions to perform following operations

  (i)To insert a sub-string in to given main string from a given position.

  (ii)To delete n Characters from a given position in a given string.

- Write a C program to determine if the given string is a palindrome or not

5.Functions &Pointers:

- Write C programs that use recursive functions

  (i) To find factorial of given number

  (ii)To solve Towers of Hanoi Problem.

  (iii)To swap the variables using call by value and call by reference.

6. Generate mark sheet of students using structures.
7. Compute Salary Slip for five employees using structures and functions Insert, Update, delete and append telephone details of an individual or a company into a telephone directory using random access file.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:
HARDWARE: 30 terminals
SOFTWARE:C compiler

TOTAL: 60 PERIODS

COURSE OUTCOMES:
At the end of the course, students would:

- Develop C programs for simple applications making use of basic constructs
- Develop C programs for control statements.
- Develop C programs involving arrays, strings and pointers.
- Develop C programs involving functions, and structures.
- Design applications using sequential and random access file processing.

CY1201A ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P	C
2	0	0	0

COURSE OBJECTIVES:

- To understand nature and the facts about the environment.
- To find and implement scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY **14**

Definition, scope and importance of environment – need for public awareness – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of major ecosystem – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity – Biodiversity at global, national and local levels – India as a mega- diversity nation – hot-spots of biodiversity – threats to biodiversity – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT II ENVIRONMENTAL POLLUTION **8**

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

UNIT III NATURAL RESOURCES **10**

Forest resources: Use and over-exploitation, deforestation, case studies- dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water – Mineral resources: environmental effects of extracting and using mineral resources, case studies – Food resources: changes caused by agriculture and overgrazing, effects of modern agriculture, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – 12 Principles of Green chemistry, role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

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

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act –- central and state pollution control boards.

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

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

1. Students will be able to understand the functions of ecosystems and appreciate the bio diversity.
2. Students will be able to know the measures to control environmental pollution.
3. Students will be able to understand the usage as well as the effects of over exploitation of natural resources.
4. Students will have knowledge about finding technological, economic and political solutions to environmental problems with various Environmental Protection Act in mind.
5. Students will be able to understand the interrelationship between population explosion and the environment and also role of IT in environment and human health.
6. Students will be able to understand that Environmental problems can only be solved by Public participation in all aspects and cannot be solved by mere laws.

TEXT BOOKS:

1. Environmental Science and Engineering by AnubhaKaushik and C.P.Kaushik-New Age International Publishers. New Delhi, 2017.

REFERENCES:

1. Benny Joseph, Environmental Studies, Tata mcgraw-Hill Publishing Company, Ltd., New Delhi, 2006.

2. Dr.B.S.Chauhan,. Environmental Studies, University Science Press, New Delhi, 2011.

MA1303A **DISCRETE MATHEMATICS**

L	T	P	C
3	1	0	4

(Common to second semester AIDS and third semester CSE/IT)

COURSE OBJECTIVES:

- To extend student‘s logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and application of Ideas to solve practical problems.
- To understand the basic concepts of combinatorics and graph theory.
- To familiarize the applications of algebraic structures.

UNIT I LOGIC AND PROOFS **12**

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

UNIT II SET THEORY **12**

Basic concepts – Notations – Subset – Algebra of sets – The power set – Ordered pairs and Cartesian product – Relations on sets –Types of relations and their properties – Relational matrix and the graph of a relation – Partitions – Equivalence relations – Partial ordering – Poset – Hasse diagram – Lattices and their properties – Sub lattices – Boolean algebra – Homomorphism.

UNIT III COMBINATORICS **12**

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

UNIT IV GRAPHS **12**

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

UNIT V ALGEBRAIC STRUCTURES **12**

Algebraic systems – Definitions-Examples-Properties-Semi groups and monoids–Homomorphism’s-Groups – Subgroups – Normal subgroup and cosets – Lagrange‘s theorem – Codes and group codes – Basic notions of error correction-Error recovery in group codes.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students would:

- Have knowledge of the concepts needed to test the logic of a program.
- Be aware of the counting principles.
- Learn the concepts of Graph Theory that would help them to define new levels of networks which are implemented in AI and ANN.
- Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.
- Be Expose the concepts and properties of Lattices and Boolean algebra used in Coding and Decoding theory of Cryptography.

TEXTBOOKS:

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

REFERENCES:

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

CW1301A DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To analyze and design combination circuits.
- To analyze and design sequential circuits.
- To understand the basic structure and operation of a digital computer.
- To study the design of data path unit, control unit for processor and to familiarize with the hazards.
- To understand the concept of various memories and I/O interfacing

UNIT I COMBINATIONAL LOGIC **9**

Combinational Circuits – Karnaugh Map - Analysis and Design Procedures – Binary Adder – Subtractor – Decimal Adder - Magnitude Comparator – Decoder – Encoder – Multiplexers –Demultiplexers.

UNIT II SYNCHRONOUS SEQUENTIAL LOGIC **9**

Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation - Registers – Counters.

UNIT III COMPUTER FUNDAMENTALS **9**

Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High Level Language.

UNIT IV PROCESSOR **9**

Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Microprogrammed Control – Pipelining – Data Hazard – Control Hazards.

UNIT V MEMORY AND I/O **9**

Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA

TOTAL: 45 PERIODS

TEXTBOOKS

1. M. Morris Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2018.
2. David A. Patterson, John L. Hennessy, "Computer Organization and Design, The Hardware/Software Interface", Sixth Edition, Morgan Kaufmann/Elsevier, 2020.

REFERENCES

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012.
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Tenth Edition, Pearson Education, 2016.
3. M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 2016.

CS1301A DATA STRUCTURES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

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

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

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

Stack ADT – Operations – Evaluating arithmetic expressions- Other Applications-Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue –Double Ended Queues – applications of queues.

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

Introduction to Tree ADT – Implementations of trees- Binary Tree ADT -tree traversals -expression trees — binary search tree ADT –Threaded Binary Trees- AVL Trees –Multi-way Search Trees-B-Tree – B+ Tree- Heap-Priority Queue.

UNIT IV GRAPHS AND HASHING **9**

Graph and their representations-Graph Traversal Techniques: Breadth First Search (BFS) and Depth First Search (DFS)-Topological Sort- Hashing- Hash Functions – Collision in hashing-Separate Chaining – Open Addressing-Rehashing-Applications of Hashing.

UNIT V SEARCHING AND SORTING **9**

Searching- Linear Search – Binary Search. Sorting – Bubble Sort – Selection Sort – Insertion Sort – Quick Sort-Merge Sort-Shell Sort – Radix Sort-Heap Sort.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Apply the concept and operations of List ADT.

- Understand and apply the concept and operations of Stack and Queue ADT
- Demonstrate the various Tree ADT and its Applications
- Apply Graph data structures and hashing concept in real-world scenarios
- Interpet the implementation of sorting and searching

TEXT BOOKS:-

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

REFERENCES:-

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

IT1301A OBJECT ORIENTED PROGRAMMING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 9

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

UNIT II INHERITANCE AND INTERFACES 9

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

UNIT III EXCEPTION HANDLING AND I/O 9

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

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 9

Understanding Threads, Thread Priorities, Synchronizing Threads, Thread lifecycle, Inter-thread communication. Generic Programming–Generic classes–generic methods–Bounded Types–Restrictions and Limitations-Introduction to JDBC, JDBC Drivers and Architecture, Accessing Database with JDBC.

UNIT V EVENT DRIVEN PROGRAMMING **9**

Graphics programming - Frame – Components - working with 2D shapes - Using color, fonts, and images - Basics of event handling - event handlers - adapter classes -actions - mouse events - Introduction to Swing –Swing GUI Components – Text Fields , Text Areas – Buttons- Check Boxes –Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes. Swing packages-Swing Control classes and Methods.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Develop Java programs using OOP principles.
- Develop Java programs using inheritance, interfaces.
- Build Java applications using Exceptions and I/O streams.
- Develop Java applications with Threads, generics classes and JDBC
- Develop interactive Desktop application using Swing and JDBC.

TEXT BOOKS:

1. Herbert Schildt, Java The complete reference, 8th Edition, McGraw Hill Education, 2011.
2. CayS.Horstmann, Gary Cornell, Core Java Volume–I Fundamentals, 9th Edition, Prentice Hall, 2013.

REFERENCES:

1. Paul Deitel, Harvey Deitel, Java SE8 for programmers, 3rd Edition, Pearson, 2015.
2. Steven Holzner, Java2Blackbook, Dream tech press, 2011.
3. Timothy Budd, Understanding Object-oriented programming with Java Updated Edition, Pearson Education, 2000.

CS1302A SOFTWARE ENGINEERING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concepts of software engineering applied in developing various software development life cycle models and agile process models.
- Understand the software requirements and the SRS documents for software projects.
- Understand the software design engineering, user-interface design and component level design.
- Learn various testing approaches applied in software development.
- Learn the methods of software project management: estimation, scheduling, planning and software risk management.

UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT **9**

Introduction: The Nature of Software, Software Engineering, The Software Process, Software Engineering practice, Software Myths, Process models: Prescriptive Process Perspective and Specialized Process Models, Agile development: Introduction to Agility - Agile Process Models: Scrum, Dynamic system development and Agile unified process-Tool Set for the Agile Process- Extreme programming-XP Process

UNIT II REQUIREMENT ENGINEERING PROCESS AND MODELING **9**

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies,

Requirements elicitation and analysis, requirements validation, requirements management. Requirements Modeling: Behavior, patterns, and web/mobile apps, Case Study: SRS-Library Management, Student Fee Registration Details.

UNIT III SOFTWARE DESIGN **9**

Design engineering: Design Process, Design Concepts, Design Model. Architectural design: Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Architectural Mapping using Data Flow. User-Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps. Component level Design: Designing Class based components-Component-Level Design for WebApps and Mobile Apps.

UNIT IV TESTING STRATEGIES **9**

Software testing strategies: A Strategic Approach to Software Testing, Test Strategies for Conventional Software and Object Oriented Software, Validation Testing, White- Box Testing, Basis Path Testing, Black-Box Testing, System Testing. Software Implementation Techniques: Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

UNIT V PROJECT AND RISK MANAGEMENT **9**

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, Risk management: Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, RMMM, RMMM Plan-Case Study: Risk Management-Manufacturing Company, Banks.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

- Develop the project by adopting suitable lifecycle models.
- Determine an appropriate process model depending on the user requirements
- Identify the suitable software design with appropriate user and component level design.
- Apply a suitable testing strategy for the designed software product.
- Apply appropriate project estimation techniques and manage the risk.

TEXT BOOKS:

1. Roger S. Pressman, “Software Engineering - A Practitioner’s Approach”, 6thEdition, TMH, 2010.
2. Sommerville, “Software Engineering”, 9th Edition, Pearson Education, 2011.

REFERENCES:

1. K.K.Agarwal& Yogesh Singh, “Software Engineering”, 3rd Edition, New Age International Publishers, 2008.
2. Shely Cashman Rosenblatt, “System Analysis and Design”, 2nd Edition, Thomson Publications, 2011.
3. PankajJalote, “An Integrated Approach to Software Engineering”, 3rd Edition, Narosa Publishing House, 2011.

CS1303A DATA STRUCTURES LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

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

LIST OF EXPERIMENTS

1. Array implementation of List ADT
2. Implement the following data structures
   Singly Linked List & Doubly Linked List
3. Array implementation of Stack and Queue ADTs
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary Search Trees
6. Implementation of AVL Trees
7. Implementation of heaps using priority queues.
8. Programs for implementation of graph traversals
   BFS & DFS
9. Implementation of searching algorithms
10. Implementation of Insertion Sort, Merge Sort, Quick Sort and Heap Sort algorithms
11. Programs to implement hashing
    Separate Chaining & Open Addressing

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 terminals
SOFTWARE:C compiler

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Demonstrate appropriate operations and applications of Linear datastructures(List, Stack and Queue) using array
- Examine functions to implement operations of Linear datastructures(List, Stack and Queue) using Linked List
- Determine the different operations of various Trees
- Apply graph traversal algorithms and techniques
- Examine various sorting, searching and hashing algorithms

IT1302A	**OBJECT ORIENTED PROGRAMMING LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

COURSE OBJECTIVES:

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

LIST OF EXPERIMENTS

1. Develop a java application using classes & objects
2. Develop a java application using packages.
3. Develop a java application using Inheritance.
4. Design a Java interface for ADT Stack. Provide necessary exception handling.
5. Write a program to perform string operations using Array List. Write functions for the following
   a. Append-add at end

b. Insert–add at particular index

c. Search
d. List all string starts with given letter.
6. Write a Java Program to create an abstract class named and demonstrate polymorphism.
7. Write a Java program to implement user defined exception handling.
8. Write a Java program that reads a filename from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. Write a java program that implement multi-threading.
10. Write a java program to create generic function.
11. Design a calculator using event-driven programming paradigm of Java with the following options.
    a) Decimal manipulations
    b) Scientific manipulations
12. Develop a simple student database management system using event-driven and concurrent programming paradigms of Java. Use JDBC to connect a back-end database.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
HARDWARE: 30 terminals
SOFTWARE:Java

TOTAL: 60 PERIODS

COURSE OUTCOMES:

- Develop and implement Java programs for simple applications that make use of classes, packages, inheritance and interfaces.
- Develop and implement Java programs with array list and exception handling
- Develop and implement Java programs using the concept of Multithreading.
- Design and develop the applications using file processing, generic programming.
- Design and develop the applications using event handling mechanism.

HS1301A	INTERPERSONAL SKILLS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES: The Course will enable learners to:

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

UNIT I COMMUNICATION **6**

Listening As A Key Skill- Its Importance- Speaking- Give Personal Information- Ask For Personal Information- Improving Pronunciation- Pronunciation Basics- Taking Lecture Notes- Preparing To Listen To A Lecture- Listen to TED/INK Talks - Articulate A Complete Idea.

UNIT II INTERPERSONAL SKILLS **6**

Interpersonal Skills- Nurturing- Empathetic- Self-Control- Patient- Sociability- Warmth- Social Skills- Team Work-Work Ethic- Willing To Work- Initiative- Self-Motivated – Integrity.

UNIT III SPEAKING NUANCES **6**

Factors Influence Fluency- Deliver A Five-Minute Informal Talk- Greet- Respond To Greetings-Describe Health And Symptoms-Invite And Offer- Accept- Decline- Take Leave- Listen For And Follow The Gist- Listen For Detail – Book/ Movie/Newspaper Articles Review

UNIT IV GROUP DISCUSSION **6**

Being An Active Listener: Giving Verbal And Non-Verbal Feedback- Participating In A Group Discussion- Asking And Getting Clarifications-Summarizing Academic Readings And Lectures- Conversational Speech- Listening To And Participating In Conversations- Persuade.

UNIT V PRESENTATIONS **6**

Formal And Informal Talk- Listen To Follow And Respond To Explanations, Directions And Instructions In Academic And Business Contexts- Strategies For Formal Presentations And Interactive Communication- Group/Pair Presentations.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

- Illustrate the communication skills in articulating a complete idea with a clarity in pronunciation
- Demonstrate Interpersonal skills with a willingness to work in team following the social work ethics
- Relate the speaking ability to respond in any informal talk detailing the content of the information in any form
- Participate in group discussions expressing active listening and reading skills to persuade the group to the desired target
- Make effective formal presentations and interactive communication in any academic and business contexts

TEXT BOOKS:

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

REFERENCES:

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

WEBSITES:

https://learnenglish.britishcouncil.org/skills/listening
https://agendaweb.org/listening-exercises.html
https://www.bbc.com/
https://placement.freshersworld.com
https://ielts-up.com
www.learnenglishteens.britishcouncil.org

MA1408A STATISTICS TECHNIQUES AND NUMERICAL METHODS

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals in real life situations.

- To introduce the numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT I TESTING OF HYPOTHESIS **12**

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

UNIT II DESIGN OF EXPERIMENTS **12**

ANOVA One way and two way classifications - Completely randomized design – Randomized block design- Latin square design - 22factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS **12**

Solution of algebraic and transcendental equations - Fixed point iteration method – NewtonRaphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION **12**

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS **12**

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods:Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture.
- Understand the knowledge of numerical techniques of interpolation and error approximation in various intervals in real life situation
- Apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

TEXT BOOKS:

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. 2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. 3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. 4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.

5. 5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012. 6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.
6. 7. Mathews, J.H. "Numerical Methods for Mathematics, Science and Engineering", 2nd Edition, Prentice Hall,1992.
7. 8. SankaraRao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, 3rd Edition, New Delhi, 2007.
8. 9. Sastry, S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2015.

CB1401A OPERATING SYSTEMS AND SECURITY (Lab Integrated)

L	T	P	C
3	0	2	4

COURSE OBJECTIVES:

- To understand the basic concepts of Operating Systems.
- To explore the process management concepts including scheduling, synchronization, threads and deadlock.
- To understand the memory, file and I/O management activities of OS.
- To understand the requirements of a trust model.
- To learn how security is implemented in various operating systems.

UNIT I OPERATING SYSTEM OVERVIEW **9**

Computer-System Organization – Architecture – Operating-System Operations – Resource Management – Security and Protection – Distributed Systems – Kernel Data Structures – Operating-System Services – System Calls – System Services – Why Applications Are Operating System Specific – Operating-System Design and Implementation - Operating-System Structure – Building and Booting an Operating System .

UNIT II PROCESS MANAGEMENT **9**

Process Concept – Process Scheduling – Operation on Processes, Inter-process Communication – Threads – Overview – Multithreading models – Threading issues; CPU Scheduling – Scheduling criteria, Scheduling algorithms; Process Synchronization – critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery.

UNIT III MEMORY MANAGEMENT AND FILE SYSTEMS **9**

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation – Virtual Memory – Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory. Mass Storage system - HDD Scheduling - File concept, Access methods, Directory Structure, Sharing and Protection; File System Structure, Directory implementation, Allocation Methods, Free Space Management

UNIT IV SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS **9**

ecurity Goals – Trust and Threat Model – Access Control Fundamentals – Protection System – Reference Monitor – Secure Operating System Definition – Assessment Criteria – Information Flow – Information Flow Secrecy Models – Denning's Lattice Model – Bell LaPadula Model – Information Flow Integrity Models – Biba Integrity Model – Low-Water Mark Integrity – Clark Wilson Integrity

UNIT V WINDOWS vs LINUX SECURITY **9**

Introduction to Operating System Security, Access Control Models, Unix-Authentication and Authorization, Operating System Security Mechanisms, Malware and Threat Analysis, Secure Software Development, Network Security and OS, File System Security

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS:

1) a) Basics of UNIX commands and shell programs Understand and practice Linux permissions, special permissions and authentication (various options of chmod, setuid, setgid) b) Simple Shell Programs
2. Write programs using the following system calls of UNIX operating system a. fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to implement the various CPU Scheduling Algorithms 4. Implementation of Semaphores
5. Implementation of Shared memory
6. Bankers Algorithm for Deadlock Detection &Avoidance
7. Implementation of the following Memory Allocation Methods for fixed partition a) First Fit b) Worst Fit c) Best Fit
8. Implementation of the following Page Replacement Algorithms
a) FIFO b) LRU c) LFU
9. Program to demonstrate the working of Bell LaPadula Model and Biba Integrity Model 10. Setting up access control lists of files and directories and testing the lists in Linux 11. Learn to enable and disable address space layout randomization
12. Develop a lab exercise that involves configuring access control lists (ACLs) on a file system. What challenges might students face in ensuring proper access rights, and how can these be addressed?
13. Set up a firewall and configure rules to protect a network. How do the rules affect inbound and outbound traffic?

TOTAL 30 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
HARDWARE: 30 terminals
SOFTWARE: C / C++ / Java

COURSE OUTCOMES:
At the end of this course, the students will be able:
CO1: Gain understanding on the concepts of Operating Systems.
CO2: Acquire knowledge on process management concepts including scheduling, synchronization, threads and deadlock.
CO3: Understanding on memory, file and I/O management activities of OS.
CO4: Understand security issues in operating systems and appreciate the need for security models **CO5:** Gain exposure to the operating systems security models of WINDOWS and UNIX OS.

TOTAL: 75 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, John Wiley & Sons, Inc., 10th Edition, 2021.
2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.

REFERENCES:

1. Morrie Gasser, “Building A Secure Computer System”, Van Nostrand Reinhold, New York, 1988.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.
3. William Stallings, “Operating Systems – Internals and Design Principles”, 9th Edition, Pearson, 2017.
4. Michael Palmer, “Guide to Operating Systems Security”, Course Technology – Cengage Learning, New Delhi, 2008.

5. Introduction to Hardware, Security and Trust, book by Mohammad Tehranipoor, Cliff Wang, Springer, 2012.
6. Gary McGraw, Software Security: Building Security In, Addison Wesley software security series, 2005

CB1402A SOFTWARE SECURITY ENGINEERING

L	T	P	C
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COURSE OBJECTIVES:

- Know the importance and need for software security.
- Know about various attacks.
- Learn about secure software design.
- Understand risk management in secure software development.
- Know the working of tools related to software security

UNIT I NEED OF SOFTWARE SECURITY AND LOW-LEVEL ATTACKS **9**

Assurance and Software Security - Threats to software security - Sources of software insecurity - Benefits of Detecting Software Security - Properties of Secure Software – Memory Based Attacks: Low-Level Attacks Against Heap and Stack - Defense Against Memory-Based Attacks .

UNIT II SECURE SOFTWARE DESIGN **9**

Requirements Engineering for secure software - SQUARE process Model - Requirements elicitation and prioritization- Isolating The Effects of Untrusted Executable Content - Stack Inspection – Policy Specification Languages – Vulnerability Trends – Buffer Overflow – Code Injection - Session Hijacking. Secure Design - Threat Modeling and Security Design Principles.

UNIT III SECURITY RISK MANAGEMENT **9**

Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management

UNIT IV SECURITY TESTING **9**

Traditional Software Testing – Comparison - Secure Software Development Life Cycle - Risk Based Security Testing – Prioritizing Security Testing With Threat Modeling – Penetration Testing – Planning and Scoping - Enumeration – Remote Exploitation – Web Application Exploitation - Exploits and Client Side Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection - Tools for Penetration Testing .

UNIT V SECURE PROJECT MANAGEMENT **9**

Governance and security - Adopting an enterprise software security framework - Security and project management - Maturity of Practice.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- At the end of the course, the students should be able to:
- Identify various vulnerabilities related to memory attacks.
- Apply security principles in software development.
- Evaluate the extent of risks.
- Involve selection of testing techniques related to software security in the testing phase of software development.
- Use tools for securing software

TEXT BOOKS:

1. Julia H. Allen, "Software Security Engineering", Pearson Education, 2008 2. Evan Wheeler, "Security Risk Management: Building an Information Security Risk Management Program from the Ground Up", First edition, Syngress Publishing, 2011
2. Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, "The Art of Software Security Testing: Identifying Software Security Flaws (Symantec Press)", Addison-Wesley Professional, 2006

REFERENCES:

1.Robert C. Seacord, "Secure Coding in C and C++ (SEI Series in Software Engineering)", Addison-Wesley Professional, 2005.
2. Jon Erickson, "Hacking: The Art of Exploitation", 2nd Edition, No Starch Press, 2008. 3. Mike Shema, "Hacking Web Apps: Detecting and Preventing Web Application Security Problems", First edition, Syngress Publishing, 2012
3. Bryan Sullivan and Vincent Liu, "Web Application Security, A Beginner's Guide", Kindle Edition, McGraw Hill, 2012
4. Lee Allen, "Advanced Penetration Testing for Highly-Secured Environments: The Ultimate Security Guide (Open Source: Community Experience Distilled)", Kindle Edition, Packt Publishing,2012
5. Jason Grembi, "Developing Secure Software".

CB1403A DATABASE MANAGEMENT SYSTEMS AND SECURITY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To learn the fundamentals of data models, conceptualize and depict a database system using ER diagram.
- To study the principles to be followed to create an effective relational database and write SQL queries to store/retrieve data to/from database systems.
- To know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
- To understand the need of security in Database Management systems
- To learn how to secure Database Management systems

UNIT I RELATIONAL DATABASES **9**

Data Models – Relational Data Models – Relational Algebra – Structured Query Language – Entity-Relationship Model – Distributed Databases - Data Fragmentation – Replication.

UNIT II DATABASE DESIGN **9**

Mapping ER Models to Relations – Functional Dependencies – Non-Loss Decomposition Functional Dependencies – First Normal Form – Second Normal Form – Third Normal Form – Dependency Preservation –Boyce/Codd Normal Form – Multi-Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT III TRANSACTION MANAGEMENT **9**

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

UNIT IV DATABASE SECURITY **9**

Database security – Common threats and challenges - Best practices and solutions - Data protection tools and platforms - SQL Injection Attacks – The Injection Technique – SQLi Attack Avenues and Types

UNIT V ACCESS CONTROL AND ENCRYPTION **9**

Database Access Control – Types - Role-based access control - SQL based access definition – Cascading Authorizations — Database Inference problem – Types of inference attacks - storage encryption

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Model an application's data requirements using conceptual modeling and design database Schemas also formulate solutions to a broad range of query problems using relational algebra/SQL.
- Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
- Run transactions and estimate the procedures for controlling the consequences of concurrent data access.
- Understand the need of security, best practices and solutions in database management systems
- Understand access control mechanisms and handle security issues in database management systems AnanyLevitin, ―Introduction to the Design and Analysis of Algorithms‖, Third Edition, Pearson Education, 2012.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2021.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.
3. William Stallings, Lawrie Brown, "Computer Security: Principles and Practice", Fourth Edition, Pearson, 2019.

REFERENCES:

1. C.J. Date, A. Kannan and S. Swamynathan, "An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006.
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems", Third Edition, McGraw Hill, 2014.
3. Narain Gehani and Melliyal Annamalai, "The Database Book: Principles and Practice Using the Oracle Database System", Universities Press, 2012

CB1404A CRYPTOGRAPHY AND INFORMATION SECURITY

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COURSE OBJECTIVES:

- Learn to analyze the security of in-built cryptosystems.
- Know the fundamental mathematical concepts related to security.
- Develop cryptographic algorithms for information security.
- Comprehend the various types of data integrity and authentication schemes ● Understand cybercrimes and cyber security.

UNIT I INTRODUCTION TO SECURITY **9**

Computer Security Concepts – The OSI Security Architecture – Security Attacks – Security Services and Mechanisms – A Model for Network Security – Classical encryption techniques: Substitution techniques,

Transposition techniques, Steganography – Foundations of modern cryptography: Perfect security – Information Theory – Product Cryptosystem – Cryptanalysis.

UNIT II SYMMETRIC CIPHERS **9**

Number theory – Algebraic Structures – Modular Arithmetic – Euclid's algorithm – Congruence and matrices – Group, Rings, Fields, Finite Fields symmetric key ciphers: sdes – Block Ciphers – DES, Strength of DES– Differential and linear cryptanalysis – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Pseudorandom Number Generators – RC4 – Key distribution.

UNIT III ASYMMETRIC CRYPTOGRAPHY **9**

Mathematics of asymmetric key cryptography: primes – primality testing – factorization – euler's totient function, fermat's and euler's Theorem – Chinese Remainder Theorem – Exponentiation and logarithm - Asymmetric key ciphers: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange -– Elliptic curve arithmetic – Elliptic curve cryptography.

UNIT IV AUTHENTICATION ALGORITHMS **9**

Authentication requirement – Authentication function – MAC – Hash function – Security of hashfunction: HMAC, CMAC – SHA – Digital signature and authentication protocols – DSS – Schnorr Digital Signature Scheme – ElGamal cryptosystem – Entity Authentication: Biometrics, Passwords, Challenge Response protocols – Authentication applications – Kerberos Mutual trust: Key management and distribution – Symmetric key distribution using symmetric and asymmetric encryption – Distribution of public keys – X.509 Certificates-PGP

UNIT V CYBER CRIME MANAGEMENT **9**

Cyber Crime and Information Security – classifications of Cyber Crimes – Tools and Methods – Password Cracking, Keyloggers, Spywares, SQL Injection – Network Access Control – Cloud Security – Web Security – Wireless Security- Dealing with Disaster –Emerging Technologies- the Law-International Laws- Cybercrime-Cyber Warfare and HomeLand Security.

COURSE OUTCOMES:

- Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
- Apply the different cryptographic operations of symmetric cryptographic algorithms CO3: Apply the different cryptographic operations of public key cryptography CO4: Apply the various Authentication schemes to simulate different applications. CO5: Understand various cyber crimes and cyber security.

TOTAL 45 PERIODS

TEXT BOOKS:

1. William Stallings, "Cryptography and Network Security – Principles and Practice", Seventh Edition, Pearson Education, 2017.

2. Nina God bole, Sunit Belapure, "Cyber Security: Understanding Cyber crimes, Computer Forensics and Legal Perspectives", First Edition, Wiley India, 2011.

REFERENCES:

1. Behrouz A. Ferouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata Mc Graw Hill, 2015.

2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.

HV1401A **UNIVERSAL HUMAN VALUES**

L	T	P	C
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Universal Human Values : Understanding Harmony

COURSE OBJECTIVE:

The objective of the course is four fold:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

COURSE TOPICS:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education **9**

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Module 2: Understanding Harmony in the Human Being - Harmony in Myself! **9**

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Module 3: Understanding Harmony in the Family and Society- Harmony in Human Relationship **9**

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence **9**

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all pervasive space
21. Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics 9

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c.Ability to identify and develop appropriate technologies and management patterns for above production systems.
26. Case studies of typical holistic technologies, management models and production systems
27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
28. Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. discuss the conduct as an engineer or scientist etc.

COURSE OUTCOMES:

- Understand the essentials of human values and skills, self-exploration, happiness and prosperity.
- Examine harmony in human being.
- Illustrate the role of harmony in family, society and universal order.
- Categorize the holistic perception of harmony at all levels of existence.
- Infer appropriate technologies and management patterns to create harmony in professional and personal lives.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria,Excel Books, New Delhi, 2010

REFERENCE BOOKS:

1. JeevanVidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).

4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)13. Gandhi - Romain Rolland (English)

CB1405A DATABASE MANAGEMENT SYSTEMS AND SECURITY LABORATORY

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COURSE OBJECTIVES:

- To learn and implement important commands in SQL.
- To learn the usage of nested and joint queries.
- To understand functions, procedures and procedural extensions of databases.
- To understand attacks on databases and to learn to defend against the attacks on databases.
- To learn to store and retrieve encrypted data in databases

PRACTICAL EXERCISES:

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2. Create set of tables, add foreign key constraints and incorporate referential integrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the database tables and explore sub queries and simple join operations.
5. Query the database tables and explore natural, equi and outer joins.
6. Write user defined functions and stored procedures in SQL.
7. Execute complex transactions and realize DCL and TCL commands.
8. Write SQL Triggers for insert, delete, and update operations in database table.
9. Use SQLi to authenticate as administrator, to get unauthorized access over sensitive data, to inject malicious statements into form field.
10. Write programs that will defend against the SQLi attacks given in the previous exercise.
11. Write queries to insert encrypted data into the database and to retrieve the data using decryption.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

- Create databases with different types of key constraints.
- Write simple and complex SQL queries using DML and DCL commands. CO3: Realize database design using 3NF and BCNF.
- Use advanced features such as stored procedures and triggers.
- Secure databases and mitigate attacks on databases

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE: 30 Terminals.

SOFTWARE: Front end: VB/VC ++/JAVA or Equivalent Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent.

CB1406A CRYPTOGRAPHY AND INFORMATION SECURITY LABORATORY

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COURSE OBJECTIVES:

- Learn different cipher techniques.
- Implement the algorithms DES, AES, RSA and Diffie-Hellman.
- Implement hashing techniques such as SHA-1, MD-5.
- Develop a digital signature scheme.

LIST OF EXPERIMENTS

1. To implement the following cipher techniques to perform encryption and decryption
   i)Caesar Cipher
   ii.Playfair Cipher
   iii. Hill Cipher
2. To implement the following transposition techniques
   (i) Rail fence technique –Row major transformation
   (ii) Rail fence technique - Column major transformation
   3.To implement DES algorithm
   4. To implement AES algorithm
   5.To implement RSA Encryption algorithm
   6. To implement the Diffie-Hellman Key Exchange mechanism. Consider one of the parties as Alice and the other party as bob.
   7. To calculate the message digest of a text using the SHA-1 algorithm.
   8. To calculate the message digest of a text using the MD-5 algorithm.
   9. To implement digital signature standard

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Develop a code for classical encryption techniques.
- Build a symmetric and asymmetric algorithm.
- Construct a code for various Authentication schemes.
- Apply the principles of digital signature

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: C / C++ / Java or equivalent compiler

HARDWARE: Standalone desktops – 30 Nos. (or) Server supporting 30 terminals or more.

HS1401A EMPLOYABILITY AND SOFT SKILLS LAB

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COURSE OBJECTIVES:

- Strengthen the Employability skills of students and develop their personality towards placement and career advancement.
- Improve the listening, speaking, reading and writing skills for comprehending and responding in academic, general and professional contexts.
- Develop students' critical thinking skills.
- Provide more opportunities to develop their project and proposal writing skills.
- Enrich the Soft Skills of the students to interact with others harmoniously.

UNIT I SOFT SKILLS **6**

Soft Skills- Interpersonal Skills - Professionalism- Courtesy-Manners - Workplace Etiquette- Business

Etiquette-Flexibility- Positive Attitude- Responsibility-Teamwork- Time Management.

UNIT II EMPLOYABILITY SKILLS **6**

Communication- Oral Presentation Practice.- Writing Skill Development- Presentation Skills -Listening Practice– Listening To Longer Technical Talks And Completing Exercises Based On Them- Enhancing Elements of Effective Communication- Motivation and Initiative- Leadership- Reliability/Dependability- Adaptability- Patience- Problem Solving- Negotiation and Persuasion.

UNIT III WRITING **6**

Writing-Plan before writing-Develop a paragraph: Topic sentence, Supporting Sentences, Concluding sentence- Coherence Markers-Writing Narrative, Descriptive, Expository, and Persuasive Paragraphs.

UNIT IV READING **6**

Reading- Reading different Genres -Collection and Organization of Ideas- Review of Books/ Newspaper Articles, Reading General and Technical Passages Writing: Email, Resume, Job Application, Technical Articles, Projects and Proposals.

UNIT V VERBAL APTITUDE & LOGICAL REASONING **6**

Aptitude- Verbal Analogy- Error Spotting, Sentence Completion for Preparation for Higher Studies and Placement- Logical Reasoning- Critical Reading and Thinking- Understanding How The Text Positions The Reader- **Writing-** Statement of Purpose- Letter of Recommendation- Vision Statement.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

- Write for different purposes in general and technical context skills in articulating a complete idea with a clarity in pronunciation
- Write formal job applications
- Excel in Verbal aptitude, read and evaluate texts logically to solve the puzzles.
- Develop and demonstrate the employability and soft skills.
- Display critical thinking in various professional contexts.

TEXTBOOK:

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

SOFTWARE: Globearena (English Language Lab & Career Lab Software)

REFERENCES:

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

WEBSITES:(Any three/ four may be listed out)

https://placement.freshersworld.com
https://www.examenglish.com
https://www.faceprep.in
https://www.fresherslive.com/online-test

IT1501A **COMPUTER NETWORKS**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

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

UNIT I INTRODUCTION AND PHYSICAL LAYER **9**

Motivation-Goals of networking-Need for a layered architecture, Network hardware-Network software - Reference models - Network standardization, RS-232 over serial line - Guided Transmission media - Wireless transmission media

UNIT II THE DATA LINK LAYER **9**

The Data Link Layer: Data link layer design issues – services provided to the network layer, Framing – Flow and error control :Error detection and correction - Elementary data link protocols – A simplex stop and wait protocol –stop and wait ARQ-Sliding window protocols, piggy backing - Wired LANs: Ethernet - Wireless LANs – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III THE NETWORK LAYER **9**

Network layer design issues –Switching techniques, IP addressing modes- IPV4, IPV6 subnetting, Routing algorithms: Flooding, Distance vector and Link state routing, Hierarchical routing, Multicasting and broadcasting - Congestion control algorithms –Internetworking

UNIT IV THE TRANSPORT LAYER **9**

Duties of Transport layer– Services – Port Numbers -Multiplexing -Demultiplexing-Congestion control, Internet transport protocols UDP, TCP, SCTP, Case Study: ATM protocols.

UNIT V THE APPLICATION LAYER **9**

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Describe the basics of the network and discuss the functions of the physical layer.
- Summarize the basics of data flow from one node to another.
- Demonstrate the various services and protocols of the network layer.
- Determine the services of different transport layer protocols.
- Examine the working of various application layer protocols.

TEXTBOOK:

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

REFERENCES:

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

CB1501A **SOCIAL NETWORK SECURITY**

L	T	P	C
3	0	0	3

COURSEOBJECTIVES:

- To develop semantic web related simple applications
- To explain Privacy and Security issues in Social Networking
- To explain the data extraction and mining of social networks
- To Discuss the prediction of human behaviour in social communities
- To describe the Access Control, Privacy and Security management of social networks

UNIT I FUNDAMENTALS OF SOCIAL NETWORKING 9

Introduction to Semantic Web, Limitations of current Web, Development of Semantic Wel Emergence of the Social Web, Social Network analysis, Development of Social Network Analysis Key Concepts and measures in network analysis, Historical overview of privacy and security, Majo paradigms, for understanding privacy and security**, Analysis of Social Networks by Tenso Decomposition,The Social Web as a Tensor.**

UNIT II SECURITY ISSUES IN SOCIAL NETWORKS 9

The evolution of privacy and security concerns with networked technologies, Contextual influence on privacy attitudes and behaviors, Anonymity in a networked world, **Communication Modes i Social Networks, Rich Media Communication Patterns.**

UNIT III EXTRACTION AND MINING IN SOCIAL NETWORKING DATA 9

Extracting evolution of Web Community from a Series of Web Archive, Detecting communities i social networks, Definition of community, Evaluating communities, Methods for communit detection and mining, Applications of community mining algorithms, Tools for detecting communitie social network infrastructures and communities, Big data and Privacy, **Data Mining Method Related to SNA and Log Mining**, **Application of SNA,** Social Influence and Diffusion Models

UNIT IV PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES 9

Understanding and predicting human behavior for social communities, User dataManagemen InferenceandDistribution, Enabling new human experiences, Reality Mining, Context,Awarenes Privacy in online social networks, Trust in online environment, What is Neo4j, Nodes, Relationship Properties ,**The Social Enabler**, **Trust Models Based on Subjective Logic.**

UNIT V ACCESS CONTROL,PRIVACYANDIDENTITYMANAGEMENT 9

Understand the access control requirements for Social Network, Enforcing Access Control Strategies,,Authentication and Authorization, Roles-based Access Control, Host, storage and network access control options, Firewalls, Authentication, and Authorization in Social Network, Identity & Access Management, Single Sign-on, Identity Federation, Identity providers and service consumers, The role of Identity provisioning ,**Combining Trust and Reputation, Social Network Providers and Their Customers.**

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1: Develop semantic web related simple applications
CO2: Address Privacy and Security issues in Social Networking
CO3: Explain the data extraction and mining of social networks
CO4: Discuss the prediction of human behavior in social communities

CO5: Describe the applications of social networks

TEXTBOOKS

1. PeterMika,"SocialNetworksandtheSemanticWeb,FirstEdition,Springer2007.
2. BorkoFurht,"HandbookofSocialNetworkTechnologiesandApplication, FirstEdition, Springer, 2010.

REFERENCES

1. EasleyD.KleinbergJ.,"Networks,Crowds,andMarkets– ReasoningaboutaHighly Connected World", Cambridge University Press, 2010.
2. Jackson,MatthewO.,"SocialandEconomicNetworks",PrincetonUniversityPress,2008.
3. GuandongXu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition, Springer, 2011.

CB1502A **INTERNET OF THINGS SECURITY** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

The student should be made to:

- To learn the internal architecture and programming of an embedded processor.
- To introduce interfacing I/O devices to the processor.
- To introduce the evolution of the Internet of Things (IoT).
- To build a small low-cost embedded and IoT system using Arduino/Raspberry Pi/ open platform.
- To apply the concept of Internet of Things in real world scenario.

UNIT I EMBEDDED, CYBER-PHYSICAL SYSTEMS AND IOT 9

Introduction, application areas, examples, Common characteristics, Challenges and design flows, Modeling of Embedded and Cyber Physical Systems - Requirements, models of computation, Finite State Machines, Timed Automata, State Charts, Modeling of Hierarchy; Data flow modeling , Discrete Event Modeling ,Continuous and Discrete time system concepts.

UNIT II IOT COMPONENTS 9

Design - Choosing the components HW platforms - Processors, Sensors, Actuators; SW stack – RTOS, Scheduling Real Time control tasks, IoT Fundamentals - Devices, Gateway; Elements of IoT - IoT Functional blocks, IoT Communication Modules and API.

UNIT III NETWORKING AND COMMUNICATION PROTOCOLS 9

Basics of Networking, Machine-to-Machine interaction, IoT Communication Protocols MQTT, ZigBee, CoAP.

UNIT IV CLOUD SECURITY 9

Concept of Cloud Computing: Everything as a Service (XaaS), Role of Cloud; Software Components - Programming API's; Cloud Security basics; IoT Application Development - Solution Framework for IoT.

UNIT V DEVELOPMENT OF IOT APPLICATIONS 9

Complete Design of IoT – Development of IoT Applications – Home Automation – Smart Agriculture – Smart Cities – Smart Healthcare. IoT. Advanced topics - Data Analytics for IoT, Fault Tolerance in IoT based Systems; IoT Security.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Explain the architecture of embedded processors.
- Write embedded C programs.
- Design simple embedded applications.
- Compare the communication models in IOT
- Design IoT applications using Arduino/Raspberry Pi /open platform

TEXT BOOK:

1. Peter Mardwel, Embedded System Foundations of Cyber Physical Systems Springer 2nd

REFERENCES:

1. E. A. Lee, SanjitSeshia Introduction to Embedded Systems – A Cyber–Physical Systems Approach. 2. Rajeev Alur, Principles of Cyber-Physical Systems.

2. Pethuru Raj and Anupama C. Raman (CRC Press) , The Internet of Things : Enabling Technologies, Platforms and Use Cases.
3. Arshdeep Bagha and Vijay Madisetti Internet of Things: A Hands-on Approach.
4. Research articles from Journals and Conference Proceedings. Raymond J.A. Buhr, Donald L.Bailey, "An Introduction to Real-Time Systems- From Design to Networking with C/C++", Prentice Hall, 1999.
5. C.M. Krishna, Kang G. Shin, "Real-Time Systems", International Editions, McGraw Hill 1997
6. K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.
7. Sriram V Iyer, Pankaj Gupta, "Embedded Real Time Systems Programming", Tata McGraw Hill, 2004.
8. Larry Pyeatt, "Modern Assembly Language Programming with ARM processor", Elsevier

CB1503A	CYBER SECURITY ESSENTIALS (LAB INTEGRATED)	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES:

The student should be made to:

- Learn to analyze the security of in-built cryptosystems.
- Know the fundamental mathematical concepts related to security.
- Develop cryptographic algorithms for information security.
- Comprehend the various types of data integrity and authentication schemes
- Understand cyber crimes and cyber security

UNIT I INTRODUCTION TO CYBER SECURITY 9

Introduction-Computer Security-Threats-Harm-Vulnerabilities-Controls–Authentication-Access Control and Cryptography-Web-UserSide-Browser Attacks-Web Attacks-Targeting-Users- Obtaining User or Website Data-Email Attacks.

UNIT II SECURITY IN OS & NETWORKS 9

Security in Operating Systems - Security in the Design of Operating Systems -Rootkit – Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service Distributed Denial-of-Service.

UNIT III VULNERABILITY DETECTION AND COUNTER MEASURES 9

Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems –Network Management-Databases-Security Requirements of Databases-Reliability and Integrity-Database Disclosure.

UNIT IV CYBERSPACE AND PRIVACY POLICIES 9

Privacy Concepts-Privacy Principles and Policies-Authentication and Privacy-Privacy on the Web – Email Security-Privacy Impacts of Emerging Technologies.

UNIT V CYBER CRIMES AND CYBER SECURITY 9

Cyber Crime and Information Security – classifications of Cyber Crimes – Tools and Methods – Password Cracking, Keyloggers, Spywares, SQL Injection – Network Access Control – Cloud Security – Web Security – Wireless Security-Case study on Ransom ware attack and Online Banking security.

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS:

1.Write and upload a basic "Hello World" (Blink LED) program.
2. Write code to read temperature and humidity.
3. Enable wireless control using a mobile app and ESP8266.
i)Interface ESP8266 with Arduino.
ii)Control an LED from a mobile app via Wi-Fi.
iii)Send sensor data to ThingSpeak/MQTT broker.
4. Implement lightweight IoT communication protocols and Use ESP8266 to connect to MQTT broker (like HiveMQ).
5. Implement periodic task using millis() or use FreeRTOS for task scheduling.
6. Create a mini agricultural monitoring system and Display data on LCD and upload to the cloud.
7. Implement basic cryptographic encryption in IoT data and Decrypt on the receiver end (Raspberry Pi or cloud).

8. simulate cyber attacks and prevention and Implement basic firewall rules in Raspberry Pi/Linux system.
9. Develop a basic intrusion detection or alert system using Python or Bash.

COURSE OUTCOMES:

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

- Summarize the basic concepts of Cyber Security
- Identify the security applications for operating system and networks
- Describe security detection and classify then various security countermeasures.
- Infer the various applicable Privacy principles and policies
- Identify cyber crimes and wireless security ,security planning and effective management of cyber security

TOTAL :75 PERIODS

TEXT BOOKS:

1. JanL.Harrington,"Network Security–A Practical Approach",Morgan Kaufmann Publishers–An Imprint of Elsevier,2005.
2. WilliamStallings,"CryptographyandNetworkSecurityPrinciplesandPractice", Pearson Education Asia, Fourth Edition,200
3.

REFERENCE BOOKS:

1. Edward Amoroso, "Cyber Security", Silicon Press, 2006
2. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing,5thEdition ,PearsonEducation,2015
3. George K. Kostopoulous, Cyber Space and Cyber Security, CRC Press,2013.
4. MarttiLehto,PekkaNeittaanmäki,CyberSecurity:Analytics,TechnologyandAutomation edited,S pringerInternationalPublishingSwitzerland2015
5. NelsonPhillipsandEnfingerSteuart,"ComputerForensicsandInvestigations",Cengage Learning, New Delhi,2009.
6. Introduction to Cyber Security available at http://uou.ac.in/foundation-course 7. Fundamentals of Information Security http://uou.ac.in/progdetail?pid=CEGCS-17 8. Cyber Security Techniques http://uou.ac.in/progdetail?pid=CEGCS-17
7. Cyber Attacks and Counter Measures: User Perspectivhttp://uou.ac.in/progdetail?pid=CEGCS-17
8. Information System http://uou.ac.in/progdetail?pid=CEGCS-17

CS1502A THEORY OF COMPUTATION

L	T	P	C
3	0	0	3

COURSEOBJECTIVES:

- To understand the language hierarchy.
- To construct automata for any given pattern and find its equivalent regular expressions.
- To understand the real time applications on automata theory.
- To design a context free grammar for any given language.
- To understand Turing Machine and their capability.
- To understand undecidable problems and NP class problems.

UNIT I AUTOMATA FUNDAMENTALS **9**

Introduction to formal proof – Additional forms of Proof – Inductive Proofs –Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Equivalence of NFA and DFA – Finite Automata with Epsilon Transitions – Equivalence of NFA with epsilon transitions and NFA

without Epsilon Transitions

UNIT II REGULAR EXPRESSIONS **9**

Regular Languages – Regular Expressions – FA and Regular Expressions – Arden's Theorem –Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata

UNIT III CONTEXT FREE GRAMMAR AND NORMAL FORMS **10**

CFG – Parse Trees – Ambiguity in Grammars and Languages – Normal Forms for CFG- Chomsky Normal Form – Griebach Normal Forms- Pumping Lemma for CFL – Closure Properties of CFL – Conversion of normal forms to Regular Expression.

UNIT IV PUSH DOWN AUTOMATA AND TURING MACHINE **9**

Definition of the Pushdown Automata – Instantaneous Descriptions – Languages of Pushdown Automata – Equivalence of Pushdown Automata and CFG -– Turing Machines – Programming Techniques for TM.

UNIT V UNDECIDABILITY **8**

Language not recursively enumerable – Undecidable Problem with RE – RICE Theorem – Undecidable Problems about TM – Recursive and recursively enumerable languages - Post's Correspondence Problem –The Class P and NP.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Construction Of DFA,NFA and ε-NFA and Regular expression for the languages
- Understand the concept of converting NFA to DFA, ε-NFA to DFA,automata to regular expressions and regular expression to automata
- Remembering pumping lemma for regular languages and context free languages
- Construct a CFG,Parse trees and PDA.
- Understand the working Principles of Turning Machine and Post correspondence problem.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. H.R.Lewis and C.H.Papadimitriou, ―Elements of the theory of Computation‖, Second Edition, PHI, 2003.
2. J.Martin, ―Introduction to Languages and the Theory of Computation‖, Third Edition, TMH, 2003.
3. MichealSipser, ―Introduction of the Theory and Computation‖, Thomson Brokecole, 1997.
4. Laurel Brodkorb, -- The Entscheidungs problem and Alan Turing, 2019.
5. Deepak D' Souza – Modern Applications of Automata Theory, 2021.

IT1503A	COMPUTER NETWORKS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

The student should be made to:

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

LIST OF EXPERIMENTS

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

TOTAL: 60 PERIODS

COURSE OUTCOMES

At the end of the course, the student should be able to:

- Illustrate the use of TCP and UDP protocols.
- Examine the performance of different transport layer protocols.
- Use simulation tools to determine the performance of various network protocols.
- Apply various routing algorithms.
- Demonstrate the use of simulation tools.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS:

HARDWARE: 30 Terminals.

SOFTWARE: 1. C / C++ / Java / Python / Equivalent Compiler 30.2. Network simulator like NS2/Glomosim/OPNET/ Packet Tracer / Equivalent

CB1504A	SOCIAL NETWORK SECURITY LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

The student should be made to:

- To develop practical skills in Semantic Web and social network structures.
- To explore privacy and security mechanisms in social networking platforms.
- To implement data extraction and mining techniques on social media datasets.
- To analyze human behavior in social networks using data analytics.
- To apply access control and identity management in social networking systems.

LIST OF EXPERIMENTS:

1. Design own social media application
2. Create a Network model using Neo4j
3. Read and write Data from Graph Database
4. Find "Friend of Friends" using Neo4j
5. Implement secure search in social media
6. Create a simple Security & Privacy detector
7. Detect communities in a network.
i)Load social network data (e.g., Twitter retweet graph).
ii) Apply Girvan–Newman or Louvain algorithm.
8. Extract and preprocess data from a social media API and Store data in a NoSQL database (e.g., MongoDB)
9. Implement sentiment analysis on user-generated content and Extract tweets 0 or comments.
10.Implement a role-based access control system and Create a web interface to manage users and roles.

TOTAL: 60 PERIODS

COURSE OUTCOMES

At the end of the course, the student should be able to:

- Build simple Semantic Web applications using RDF and OWL.
- Visualize and analyze social networks using tools like Gephi or NetworkX.
- Simulate privacy settings and apply anonymization in social networks.
- Detect and analyze communities in social media data.
- Predict user behavior and sentiment from social network data.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

TEXTBOOK :

1.LearningNeo4j3.x"Second Edition By Jérôme Baton, Rik Van Bruggen, Packt publishing
2.David Easley, Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning about a Highly Connected World‖, First Edition, Cambridge University Press, 2010.

CB1601A CYBER FORENSICS

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To learn cyber crime and forensics
- To become familiar with forensics tools
- To learn to analyze and validate forensics data
- To understand cyber laws and the admissibility of evidence with case studies
- To learn the vulnerabilities in network infrastructure with ethical hacking

UNIT I BASICS OF CYBER FORENSICS 9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Role of ECD and ICT in Cybercrime - Classification of Cyber Crime. The Present and future of Cybercrime - Cyber Forensics -Steps in Forensic Investigation - Forensic Examination Process - Types of CF techniques - Forensic duplication and investigation - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT II DIGITAL EVIDENCE COLLECTION & FORENSICS TOOLS AND TECHNIQUES 9

Processing Crime and Incident Scenes – Digital Evidence - Sources of Evidence -Working with File Systems. - Registry - Artifacts - Current Computer Forensics Tools: Software/ Hardware Tools - Forensic Suite - Acquisition and Seizure of Evidence from Computers and Mobile Devices - Chain of Custody-Forensic Techniques

UNIT III FORENSIC ANALYSIS AND VALIDATION 9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics - Analysis of Digital Evidence - Admissibility of Evidence - Cyber Laws in India - Case Studies

UNIT IV BASICS OF ETHICAL HACKING 9

Introduction to Ethical Hacking - Ethical Footprinting Through Search Engines-Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats – Sniffing – Email Tracking

UNIT V APPLICATIONS AND LEARNING 9

Components of a Wireless Network -Wireless Hacking -Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications – SQL Injection - Hacking Mobile Platforms.

TOTAL :45 PERIODS

COURSE OUTCOMES:

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

- Understand the basics of cyber crime and computer forensics
- Apply a number of different computer forensic tools to a given scenario
- Analyze and validate forensics data
- Understand Admissibility of evidence in India with Cyber laws and Case Studies
- Identify the vulnerabilities in a given network infrastructure

TEXT BOOKS:

1 Bill Nelson, Amelia Phillips, Christopher Steuart, ―Guide to Computer Forensics and
2 Investigations, Cengage Learning, India Sixth Edition, 2020.

REFERENCES:

1. John R.Vacca, "Computer Forensics ", Cengage Learning, 2005.
2. MarjieT.Britz, "Computer Forensics and Cyber Crime: An Introduction 3rd Edition, Prentice
3. Hall, 2013.
4. AnkitFadia " Ethical Hacking, Second Edition, Macmillan India Ltd, 2006.
5. Kenneth C.Brancik "Insider Computer Fraud Auerbach Publications Taylor & Francis Group– 2008.

CB1602A	WEB APPLICATION SECURITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Understand the fundamentals of web application security, authentication, authorization, communication.
- Analyse security challenges in web applications and implement secure development practices.
- Apply secure API development techniques to protect data and services from security threats.
- Evaluate web applications for vulnerabilities using assessment & penetration testing methodologies.
- Create security strategies by leveraging hacking techniques and security tools for threat mitigation.

UNIT I FUNDAMENTALS OF WEB APPLICATION SECURITY 9

The history of Software Security-Recognizing Web Application Security Threats, Web Application Security, Authentication and Authorization, Secure Socket layer, Transport layer Security, Session Management-Input Validation

UNIT II SECURE DEVELOPMENT AND DEPLOYMENT 9

Web Applications Security - Security Testing, Security Incident Response Planning,The Microsoft Security Development Lifecycle (SDL), OWASP Comprehensive Lightweight Application Security Process (CLASP), The Software Assurance Maturity Model (SAMM). Session Fixation: Explores case studies of session fixation vulnerabilities and how to prevent them.

UNIT III SECURE API DEVELOPMENT 9

API Security- Session Cookies, Token Based Authentication, Securing Natter APIs: Addressing threats with Security Controls, Rate Limiting for Availability, Encryption, Audit logging, Securing service-to-service APIs: API Keys , OAuth2, Securing Microservice APIs: Service Mesh, Locking Down Network Connections, Securing Incoming Requests.API Authentication and Authorization Flaws: Case studies of attacks targeting improperly secured APIs, like token leakage or weak authentication protocols.

UNIT IV VULNERABILITY ASSESSMENT AND PENETRATION TESTING 9

Vulnerability Assessment Lifecycle, Vulnerability Assessment Tools: Cloud-based vulnerability scanners, Host-based vulnerability scanners, Network-based vulnerability scanners, Database based vulnerability scanners, Types of Penetration Tests: External Testing, Web Application Testing, Internal Penetration Testing, SSID or Wireless Testing, Mobile Application Testing.

UNIT V HACKING TECHNIQUES AND TOOLS 9

Social Engineering, Injection, Cross-Site Scripting(XSS), Broken Authentication and Session Management, Cross-Site Request Forgery, Security Misconfiguration, Insecure Cryptographic 130 Storage, Failure to Restrict URL Access, Tools: Comodo, OpenVAS, Nexpose, Nikto, Burp Suite, etc, Cobalt Strike, Metasploit - Advanced penetration testing,Dark Web Monitoring Tools - Tracking compromised credentials and threats.

TOTAL:45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

CO1: Understand the fundamental principles of web application security & recognize common threats.

CO2: Understand about secure development and deployment techniques for web applications.

CO3: Apply security concept to secure web applications using best practices in API security.

CO4: Analyze vulnerabilities in web applications and conduct penetration testing effectively.

CO5: Analyze various hacking techniques and utilize security tools to enhance application security.

TEXT BOOKS:

1. Andrew Hoffman, Web Application Security: Exploitation and Countermeasures for Modern Web Applications, First Edition, 2020, O'Reilly Media, Inc.
2. Bryan Sullivan, Vincent Liu, Web Application Security: A Beginners Guide, 2012, The McGrawHill Companies.
3. Neil Madden, API Security in Action, 2020, Manning Publications Co., NY, USA.

REFERENCES:

1. Michael Cross, Developer's Guide to Web Application Security, 2007, Syngress Publishing, Inc.
2. Ravi Das and Greg Johnson, Testing and Securing Web Applications, 2021, Taylor & Francis Group, LLC.
3. Prabath Siriwardena, Advanced API Security, 2020, Apress Media LLC, USA.
4. Malcom McDonald, Web Security for Developers, 2020, No Starch Press, Inc.
5. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, and Terron Williams Grey Hat Hacking: The Ethical Hacker's Handbook, Third Edition, 2011, The McGraw-Hill Companies.

CS1603A ARTIFICIAL INTELLIGENCE

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the various characteristics of Intelligent agents
- To learn the different search strategies in AI
- To apply logical and probabilistic reasoning in solving AI problems
- To know about the various applications of AI.
-

UNIT I INTRODUCTION 9

Introduction–Definition – Future of Artificial Intelligence- Production systems, Types of Production systems –Typical Intelligent Agents – Agents and Environments – concept of rationality – nature of environments – Structure of agents.

UNIT II PROBLEM SOLVING METHODS 9

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

UNIT III LOGICAL REASONING **9**

Knowledge-based agents – propositional logic – propositional theorem proving – propositional model checking – agents based on propositional logic. First-order logic – syntax and semantics – knowledge representation and engineering – inferences in first-order logic – forward chaining – backward chaining – resolution.

UNIT IV PROBABILISTIC REASONING **9**

Acting under uncertainty – Bayesian inference – naïve Bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks

UNIT V APPLICATIONS AND LEARNING **9**

Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition –Introduction to Machine Learning-Types of Machine Learning

TOTAL :45 PERIODS

COURSE OUTCOMES:

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

- Illustrate the intelligent agent frameworks and its environments.
- Analyze real life problems and solve those using searching algorithms and AI techniques.
- Analyze and apply logical reasoning in solving AI problems using first order and predicate logic.
- Demonstrate the applications of Probabilistic Reasoning in Bayesian Networks.
- Examine the various applications of AI and types of Learning.

TEXT BOOKS:

1 S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2009.

2 I. Bratko, ―Prolog: Programming for Artificial Intelligence‖, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

1. M. Tim Jones, ―Artificial Intelligence: A Systems Approach(Computer Science)‖, Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, ―The Quest for Artificial Intelligence‖, Cambridge University Press, 2009.
3. Stephen Marsland, ―Machine Learning – An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
4. William F. Clocksin and Christopher S. Mellish,‖ Programming in Prolog: Using the ISO Standard‖, Fifth Edition, Springer, 2003.
5. Gerhard Weiss, ―Multi Agent Systems‖, Second Edition, MIT Press, 2013.
6. David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents‖, Cambridge University Press, 2010.

CB1603A **ETHICAL HACKING**

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To learn about the importance of ethical information security.
- To learn different ethical scanning and enumeration methodologies and tools.
- To understand various ethical hacking techniques and attacks
- To be exposed to programming languages for ethical security professionals.
- To understand the different phases in ethical penetration testing.

UNIT I INTRODUCTION TO ETHICAL HACKING AND SECURITY 9

Ethical Hacking Overview - Role of Security and Penetration Testers - PenetrationTesting, Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing .- Network and Computer Attacks - Malware -Protecting Against Malware Attacks.- Intruder Attacks - Addressing Physical Security.

UNIT II ETHICAL FOOTPRINTING AND NETWORK SCANNING 9

Ethical Footprinting Concept - Ethical Footprinting Through Search Engines, Web Services, Social Media Sites, Websites, Emails - Basic Information Gathering Techniques - Ethical Footprinting Through Social Engineering - Introduction to Network Scanning - Basic Port-Scanning Tools and Techniques - Identifying Network Vulnerabilities - Understanding IDS and Firewalls.

UNIT III ENUMERATION TECHNIQUES AND SYSTEM VULNERABILITIES 9

Enumeration Concepts - NetBIOS Enumeration – SNMP, LDAP, NTP, SMTP and DNS, Enumeration - Vulnerability Assessment Concepts - Desktop and Server OS Vulnerabilities - Windows OS Vulnerabilities - Tools for Identifying Vulnerabilities in Windows- Linux OS, Vulnerabilities- Vulnerabilities of Embedded Oss.

UNIT IV ETHICAL HACKING OF WEB AND WIRELESS NETWORKS 9

Hacking Web Servers - Web Application Components- Vulnerabilities - Tools for Web Attackers and Security Testers Hacking Wireless Networks - Components of a Wireless Network – Wardriving- Wireless Hacking - Tools of the Trade - Case Studies.

UNIT V NETWORK SECURITY, INTRUSION DETECTION, AND PREVENTION 9

Access Control Lists. - Cisco Adaptive Security Appliance Firewall - Configuration and Risk Analysis Tools for Firewalls and Routers - Intrusion Detection and Prevention Systems - Network- Based and Host-Based IDSs and IPSs - Web Filtering - Security Incident Response Teams – Honeypots - Tools & Frameworks.

TOTAL:45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Identify and analyse security threats in ethical hacking and penetration testing. (BTL-4)
- Apply ethical hacking tools for footprinting, scanning, and enumeration. (BTL-3)
- Evaluate vulnerabilities in Windows, Linux, and embedded systems. (BTL-5)
- Apply ethical hacking techniques to web servers and wireless networks. (BTL-3)
- Analyze the security requirements of a network and identify the appropriate measures, including firewalls, IDS, and intrusion prevention systems, to address potential vulnerabilities. (BTL-4)

TEXT BOOKS:

1. Rob Wilson, Michael T. Simpson, and Nicholas Antill, Hands-On Ethical Hacking and Network Defense, 4th Edition, Course Technology, Cengage Learning, 2022.
2. Patrick Engebretson, The Basics of Hacking and Penetration Testing, SYNGRESS, Elsevier, 2013.
3. Dafydd Stuttard and Marcus Pinto, The Web Application Hacker’s Handbook: Finding and Exploiting Security Flaws, 2011.
4. Alana Maurushat, Ethical Hacking, University of Ottawa Press/Les Presses de l’Université d’Ottawa, 2019.

REFERENCES:

1. EC-Council, “Ethical Hacking and Countermeasures: Attack Phases”, Cengage Learning, 2010.
2. Jon Erickson, “Hacking, 2nd Edition: The Art of Exploitation”, No Starch Press Inc., 2008.
3. Michael T. Simpson, Kent Backman, James E. Corley, “Hands-On Ethical Hacking and Network Defense”, Cengage Learning, 2013.
4. Patrick Engebretson, “The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy”, Second Edition, Elsevier, 2013.
5. RafayBoloch, “Ethical Hacking and Penetration Testing Guide”, CRC Press, 2014.

CB1604A	ENGINEERING SECURE SOFTWARE SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Know the importance and need for software security.
- Know about various attacks.
- Learn about secure software design.
- Understand risk management in secure software development.
- Know the working of tools related to software security.

UNIT I NEED OF SOFTWARE SECURITY AND LOW-LEVEL ATTACKS 9

Software Assurance and Software Security - Threats to software security - Sources of software insecurity - Benefits of Detecting Software Security - Properties of Secure Software – Memory-Based Attacks: Low-Level Attacks Against Heap and Stack - Defense Against Memory-Based Attacks

UNIT II SECURE SOFTWARE DESIGN 9

Requirements Engineering for secure software - SQUARE process Model - Requirements elicitation and prioritization- Isolating The Effects of Untrusted Executable Content - Stack Inspection – Policy Specification Languages – Vulnerability Trends – Buffer Overflow – Code Injection - Session Hijacking. Secure Design - Threat Modeling and Security Design Principles

UNIT III SECURITY RISK MANAGEMENT 9

Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management

UNIT IV SECURITY TESTING 9

Traditional Software Testing – Comparison - Secure Software Development Life Cycle - Risk Based Security Testing – Prioritizing Security Testing With Threat Modeling – Penetration Testing – Planning and Scoping - Enumeration – Remote Exploitation – Web Application Exploitation -Exploits and Client Side Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection- Tools for Penetration Testing

UNIT V SECURE PROJECT MANAGEMENT 9

Governance and security - Adopting an enterprise software security framework - Security and project management - Adequate Security- Risk Management Framework for Software Security - Maturity of Practice

TOTAL:45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

CO1: Identify various vulnerabilities related to memory attacks. (BTL-3)
CO2: Apply security principles in software development.(BTL-3)
CO3: Evaluate the extent of risks.(BTL-4)
CO4: Apply testing techniques related to software security in the testing phase of software development.(BTL-3)
CO5: Identify the tools for securing software.(BTL-3)

TEXT BOOKS:

1. Julia H. Allen, "Software Security Engineering", Pearson Education, 2008
2. Evan Wheeler, "Security Risk Management: Building an Information Security Risk Management Program from the Ground Up", First edition, Syngress Publishing, 2011
3. Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, "The Art of Software Security Testing: Identifying Software Security Flaws (Symantec Press)", Addison-Wesley Professional, 2006

REFERENCES:

1.Robert C. Seacord, "Secure Coding in C and C++ (SEI Series in Software Engineering)", Addison-Wesley Professional, 2005.
2.Jon Erickson, "Hacking: The Art of Exploitation", 2nd Edition, No Starch Press, 2008.
3.Mike Shema, "Hacking Web Apps: Detecting and Preventing Web Application Security Problems", First edition, Syngress Publishing, 2012
4.Bryan Sullivan and Vincent Liu, "Web Application Security, A Beginner's Guide", Kindle Edition, McGraw Hill, 2012
5.Lee Allen, "Advanced Penetration Testing for Highly-Secured Environments: The Ultimate Security Guide (Open Source: Community Experience Distilled)", Kindle Edition, Packt Publishing,2012
6.Jason Grembi, "Developing Secure Software"

CB1605A CYBER FORENSICS LABORATORY L T P C
0 0 4 2

COURSE OBJECTIVES

- Explore Forensic tools.
- Understand the recovery operation of deleted files.
- Acquire the forensic image of the hard disk with integrity checking.
- Understand the collection of email evidence and extraction of browser artifacts.
- Performing live Forensics Case Investigation.

LIST OF EXPERIMENTS

1. Study and Explore the following forensic tools:
(a) FTK Imager
(b) Autopsy
(c) EnCase Forensic Imager
(d) LastActivityView
(e) USBDeview
2. Recover deleted files using FTKImager
3. Acquire forensic image of hard disk using EnCase Forensics Imager and also perform integrity checking/validation
4. Restore the Evidence Image using EnCase Forensics Imager.
5. Study the following: (a) Collect Email Evidence in Victim PC. (b) Extract Browser Artifacts (Chrome History view for Google Chrome)
6. Use USBDeview to find the last connected USB to the system
7. Perform Live Forensics Case Investigation using Autopsy 8. Study Email Tracking and EmailTracing and write a report on them.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
HARDWARE: 30 terminals
SOFTWARE:
FTK Imager
Autopsy
EnCase Forensic Imager
LastActivityView
USBDeview
Chrome History View

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

- Utilize various forensic tools for investigation.
- Demonstrate data recovery and forensic imaging.
- Analyze and interpret forensic evidence.
- Demonstrate live forensic investigations.
- Generate comprehensive forensic report.

MG1701A **PRINCIPLES OF MANAGEMENT** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

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

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

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

UNIT II PLANNING 9

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

UNIT III ORGANISING 9

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

UNIT IV DIRECTING 9

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

UNIT V CONTROLLING 9

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Understand about the planning and decision making process of management.
- Understand the organization structure, HR planning and control.
- Apply functions of management like motivation, leadership and communication.
- Analyze the performance controlling process, techniques of control and reporting to the management.

- Apply principles of management in order to execute the role as a manager in IT industry.

TEXTBOOKS:

1. Stephen P. Robbins & Mary Coulter, "Management", 10th Edition, Prentice Hall (India) Pvt. Ltd., 2009. 2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.

REFERENCES:

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

CB1701A CRYPTOCURRENCY AND BLOCKCHAIN TECHNOLOGIES

L	T	P	C
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COURSE OBJECTIVES:

To understand the basics of Blockchain

- To learn different protocols and consensus algorithms in Blockchain
- To learn the Blockchain implementation frameworks
- To understand the Blockchain Applications
- To experiment the Hyperledger Fabric, Ethereum networks.

UNIT I BASICS OF BLOCK CHAIN **9**

Distributed Database, Two General Problem-Blockchain- Public Ledgers, Blockchain as Public Ledgers - Block in a Blockchain, Transactions-The Chain and the Longest Chain - Permissioned Model of Blockchain, Cryptographic -Hash Function, Properties of a hash function-Hash pointer and Merkle tree-Soft & Hard Fork, Private and Public blockchain

UNIT II BITCOIN AND CRYPTOCURRENCY **9**

A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, GHOST, Vulnerability, Attacks, Sidechain, Namecoin

UNIT III DISTRIBUTED CONSENSUS **9**

Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Difficulty Level, Sybil Attack, Energy utilization and alternate.Permissioned model and use cases.

UNIT IV HYPERLEDGER FABRIC AND ETHEREUM **9**

Architecture of Hyperledger fabric v1.1- chain code- Ethereum: Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity, Case Study-Ethereum Construction.

UNIT V TRENDS IN BLOCKCHAIN APPLICATIONS **9**

Smart contracts, Truffle Design and issue- DApps- NFT. Blockchain Applications in Supply Chain Management, Logistics, Smart Cities, Finance and Banking, Insurance, Internet of Things, Medical Record Management System, Domain Name Service and future of Block chain- Case Study.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, the students should be able to:

CB1501A.1: Understand the basics of Blockchain Technology

CB1501A.2:Identify the major research challenges and technical gaps existing between theory and practice in the crypto currency domain.

CB1501A.3 Demonstrate bitcoin consensus and mining difficulty.

CB1501A.4:Apply hyperledger Fabric and Ethereum platform to implement the Block chain Application.

CB1501A.5: Identify the new trends in Blockchain Applications.

TEXT BOOKS:

1. Bashir and Imran, Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and Popular Blockchain frameworks, 2017.

2. Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly, 2014

REFERENCES:

1. Daniel Drescher, "Blockchain Basics", First Edition, Apress, 2017.

2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. PrincetonUniversity Press, 2016.

3. Melanie Swan, "Blockchain: Blueprint for a New Economy", O'Reilly, 2015

4. Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Blockchain", Packt Publishing

5.Handbook of Research on Blockchain Technology, published by Elsevier Inc. I SBN: 9780128198162, 2020.

CS1703A	**SUMMER INTERNSHIP**	**L**	**T**	**P**	**C**
		0	**0**	**0**	**2**

COURSE OBJECTIVES:

To enable the students to

- Get connected with reputed industry/ laboratory/academia / research institute
- Get practical knowledge on Product Development / Services and operations / Software Design and Development / Testing / Analytics/ research/ startups/ professionalism / business processes and insights / domain knowledge/ Industry Practices/ and other related aspects and develop skills to solve related problems
- Develop technical, soft, team skills to cater to the needs of the industry / academia / businesses / research / organizations in the core aspects of Automation, Digitalization

The students individually undergo training in reputed firms/ research institutes / laboratories for the specified duration. After the completion of training, a detailed report should be submitted within ten days from the commencement of next semester. The students will be evaluated as per the Regulations.

No. of Weeks: 04

COURSE OUTCOMES:

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

- Understand the basic concepts related to the assigned project work during industrial training/certification course.

- Analyze the assigned problem by considering its impact on society and environment Justify and discuss the design solution for the problem.
- Demonstrate the ability to work effectively in team with commitments to professional ethics.
- Conclude the project work through proper documentation in the form of project report.

IT1701A DISTRIBUTED SYSTEMS AND CLOUD COMPUTING

L	T	P	C
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COURSE OBJECTIVES:

- Understand the fundamental concepts and characteristics of distributed systems.
- Identify key issues such as scalability, fault tolerance, and concurrency in distributed environments.
- Learn distributed system models and communication mechanisms like RPC and RMI.
- Apply logical clocks and causal ordering in synchronizing distributed events.
- Analyze algorithms for leader election, mutual exclusion, and deadlock detection in distributed systems

UNIT I INTRODUCTION TO DISTRIBUTED SYSTEM CONCEPTS **9**

Introduction to Distributed Systems – Characteristics – Issues in Distributed Systems -Distributed System Model – Request/Reply Protocols – RPC – RMI – Logical Clocks and Casual Ordering of Events – Election Algorithm – Distributed Mutual Exclusion -Distributed Deadlock Detection Algorithms.

UNIT II PROCESSES AND PROCESSORS IN DISTRIBUTED SYSTEMS **9**

Threads, system model, processor allocation, scheduling in distributed systems: Load balancing and sharing approach, fault tolerance, Real time distributed systems, Process migration and related issues

UNIT III INTRODUCTION TO CLOUD COMPUTING **9**

Introduction to Cloud Computing – Evolution of Cloud Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning – NIST Cloud Computing Reference Architecture– Architectural Design Challenges – Deployment Models: Public, Private and Hybrid Clouds – Service Models: IaaS – PaaS – SaaS – Benefits of Cloud Computing.

UNIT IV CLOUD ENABLING TECHNOLOGIES **9**

Introduction to Web Service and Service Oriented Architecture – SOAP – REST – Basics of Virtualization – Full and Para Virtualization– Implementation Levels of Virtualization – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices – Desktop Virtualization – Server Virtualization.

UNIT V CLOUD MANAGEMENT, STORAGE AND SECURITY **9**

Resource Provisioning and Methods – Cloud Management Products – Cloud Storage – Provisioning Cloud Storage – Managed and Unmanaged Cloud Storage – Cloud Security Overview – Cloud Securit Challenges –Security Architecture. Case Studies: Openstack, Amazon EC2, AWS, Microsoft Azure, Google Compute Engine.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

- Critically analyze and evaluate the diverse web services and emerging technologies employed in modern IT solutions.
- Create dynamic web pages using DHTML and java script that is easy to navigate and use.
- Construct server-side web pages to process and respond to client-side requests.
- Analyze web data structures for XML representation and examine XML integration in JSP for dynamic web page development.
- Explore the categorization of various web services and emerging technologies.

TEXT BOOKS:

1. Buyya R., Broberg J., Goscinski A., "Cloud Computing: Principles and Paradigm", John Wiley, 2011.
2. John W. Rittinghouse, James F. Ransome, "Cloud Computing: Implementation "Management and Security", CRC Press, 2016.
3. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, Maarten Van Steen, "Distributed Systems - Principles and Paradigms", Second Edition, Pearson, 2016.
2. Mukesh Singhal, "Advanced Concepts In Operating Systems", McGraw Hill Series in Computer Science, 2017.

PROFESSIONAL ELECTIVES – I

CB1607A	DATA ENCRYPTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Understand the fundamentals of cryptography, security concepts, and the need for securing information systems.
- Learn classical and modern cryptographic techniques including symmetric and asymmetric encryption methods.
- Analyze and evaluate various types of network attacks and understand strategies for secure authentication and communication.
- Grasp the theoretical foundations of data compression, and understand the need and principles behind efficient data encoding.
- Explore and implement various lossless and lossy data compression techniques used in real-world applications.

UNIT I INTRODUCTION TO SECURITY CONCEPTS 9

Need for security, Security approaches, Principles of security, Types of attacks. Plaintext, Ciphertext, Substitution & Transposition techniques, Encryption & Decryption, Types of attacks, Key range & Size, Steganography Techniques, **Mathematics in Cryptography,** Smart Card Security.

UNIT II CRYPTOGRAPHIC ALGORITHMS AND DIGITAL SECURITY 9

Algorithm types & Modes, DES, IDEA, Differential & Linear Cryptanalysis, RSA, Symmetric & Asymmetric key together, Digital signature, Knapsack algorithm,Advanced Encryption Standard (AES), Elliptic Curve Cryptography (ECC), RC4, RC5, and RC6 Algorithms.

UNIT III NETWORK ATTACKS, AUTHENTICATION & CRYPTOGRAPHY APPLICATIONS

Denial of service attacks, IP spoofing attacks, Conventional Encryption and Message Confidentiality, Conventional Encryption Algorithms, Key Distribution.Approaches to Message Authentication, SHA-1, MD5, Public-Key Cryptography Principles, RSA, Digital, Signatures, Key Management, Firewall. Kerberos Authentication Protocol, X.509 Certificate Standards, Secure Sockets Layer (SSL) and Transport Layer Security (TLS)

UNIT IV DATA COMPRESSION FUNDAMENTALS 9

Need for data compression, Fundamental concept of data compression & coding, Communication model, Compression ratio, Requirements of data compression, Classification. Datacompression--Lossless&Lossy, Entropy and Information Theory, Shannon's Source Coding Theorem, Channel Capacity and Coding Theorems

UNIT V DATA COMPRESSION TECHNIQUES 9

Repetitive character encoding, Run length encoding, Zero/Blank encoding; Statistical encoding--Huffman, Arithmetic & Lempel-Ziv coding; Source encoding-- Vector quantization (Simple vector quantization & with error term),Burrows-Wheeler Transform (BWT), Arithmetic Coding, Convolutional Codes and Viterbi Algorithm.

TOTAL :45 PERIODS

COURSE OUTCOMES:

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

CO1: Explain the basic concepts of security, types of attacks, and cryptographic principles. .
CO2: Apply classical and modern encryption/decryption algorithms including DES, RSA, and ECC.
CO3: Analyze different types of cryptanalysis and evaluate the strength of encryption methods.
CO4: Design secure communication channels using protocols like SSL/TLS, Kerberos, and PKI.
CO5: Understand the mathematical basis of information theory and data compression.

TEXTBOOKS

1. Cryptography and Network Security, Mohammad Amjad, John Wiley& Sons.
2. Cryptography & Network Security by Atul Kahate, TMH.
3. Information Theory and Coding, Muralidhar Kulkarni, KS Shivaprakasha, JohnWiley & Sons

REFERENCES

1. Cryptography and Network Security by B.Forouzan, McGraw-Hill.
2. The Data Compression Book by Nelson, BPB.
3. Cryptography & Network Security, V.K.Jain, Khanna Publishing House.

CB1608A SECURITY ASSESSMENT AND RISKANALYSIS L T P C
3 0 0 3

COURSE OBJECTIVES:

- Understand core information security concepts, including the CIA triad and common threats.
- Identify and assess risks, and implement suitable countermeasures and controls.
- Learn security and contingency planning, including disaster recovery and business continuity.
- Gain knowledge of personnel security, auditing, and monitoring practices.
- Explore operational security and technical safeguards such as encryption and cryptography.

UNIT I FUNDAMENTALS OF INFORMATION SECURITY 9

Information Security (INFOSEC) Overview: critical information characteristics – availability information states – processing security countermeasures-education, training and awareness, critical informationcharacteristics – confidentiality critical information characteristics – integrity, information states – storage, information states – transmission, security countermeasures-policy, procedures and practices, threats, vulnerabilities. CIA triad.

UNIT II THREATS, VULNERABILITIES, AND RISK MANAGEMENT 9

Threats to and Vulnerabilities of Systems: Threats, major categories of threats (e.g., fraud, Hostile Intelligence Service (HOIS). Counter measures: assessments (e.g.,surveys, inspections). Concepts of Risk Management: consequences (e.g., corrective action, risk assessment), cost/benefit analysis and implementation of controls, monitoring the efficiency and effectiveness of controls (e.g., unauthorized or inadvertent disclosure of information).

UNIT III SECURITY AND CONTINGENCY PLANNING 9

Security Planning: directives and procedures for policy mechanism.
Contingency Planning/Disaster Recovery: agency response procedures and continuity of operations, contingency plan components, determination of backup requirements, development of plans for recovery actions after a disruptive event,Risk assessment, cost/benefit, control effectiveness.

UNIT IV PERSONNEL SECURITY AND AUDITING **9**

Personnel Security Practices and Procedures: access authorization/verification (need- to-know), contractors, employee clearances, position sensitivity, security training and awareness, systems maintenance personnel. Auditing and Monitoring: conducting security reviews, effectiveness of security programs, investigation of security breaches, privacy review of accountability controls, review of audit trails and logs,Directives, policies, implementation

UNIT V OPERATIONS SECURITY AND TECHNICAL SAFEGUARDS **9**

Operations Security(OPSEC):OPSEC surveys/OPSEC planning INFOSEC: computer security – audit, cryptography-encryption (e.g., point-to-point, network, link). Case study of threat and vulnerability assessment.

TOTAL :45 PERIODS

COURSE OUTCOMES:

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

CO1:Explain the core principles of information security, focusing on the CIA triad.

C**O2:** Identify and classify threats and vulnerabilities, and assess appropriate countermeasures.

C**O3:** Analyze risk management and design effective contingency and disaster recovery plans.

C**O4:** Implement personnel security measures and conduct security audits and monitoring.

C**O5:** Apply OPSEC principles and use cryptographic techniques to secure information systems.

TEXTBOOKS

1. Information Systems Security, 2ed: Security Management, Metrics, Frameworks and Best Practices, Nina Godbole, John Wiley & Sons.
2. Principles of Incident Response and Disaster Recovery, Whitman & Mattord, Course Technology ISBN: 141883663X.

REFERENCES

1. **Security Risk Assessment Handbook: A Complete Guide for Performing Security Risk Assessments** by Douglas J. Landoll. ISBN: 9780367333564
2. **Information Security Risk Assessment Toolkit: Practical Assessments through Data Collection and Data Analysis** by Mark Talabis, Jason Martin, Carl Botterill, and Julie Walters. ISBN: 9780123815491

CB1609A DATABASE SECURITY AND ACCESS CONTROL

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COURSE OBJECTIVES:

- Understand the fundamentals and evolution of access control systems.
- Explore various access control models, policies, and mechanisms.
- Study the concepts and applications of Role-Based Access Control (RBAC).
- Learn the architecture and security of smart card technologies.
- Examine modern cloud data security practices and audit mechanisms.

UNIT I FUNDAMENTALS OF ACCESS CONTROL 9

Introduction to Access Control, Purpose and fundamentals of access control,History and evolution of access control system,Types of access control environments (physical vs. logical),Threat models and risk assessment in access control.

UNIT II ACCESS CONTROL POLICIES, MODELS, AND MECHANISMS 9

Policies of Access Control, Models of Access Control, and Mechanisms, Discretionary Access Control (DAC), Non- Discretionary Access Control, Mandatory Access Control (MAC). Capabilities and Limitations of Access Control Mechanisms: Access Control List (ACL) and Limitations, Capability List and Limitations. Attribute-Based Access Control (ABAC) and comparison with DAC/MAC

UNIT III **ROLE-BASED ACCESS CONTROL (RBAC) AND ENTERPRISE I NTEGRATION** 9
Role-Based Access Control (RBAC) and Limitations, Core RBAC, Hierarchical RBAC, Statically Constrained RBAC, Dynamically Constrained RBAC, Limitations of RBAC. Comparing RBAC to DAC and MAC Access Control policy, Integrating RBAC with enterprise IT infrastructures: RBAC for WFMSs.

UNIT IV SMART CARD SECURITY AND APPLICATIONS 9

Smart Card based Information Security, Smart card operating system-fundamentals, design and implantation principles, memory organization, smart card files, file management. PPS Security techniques- user identification, smart card security, quality assurance and testing, smart card life cycle-5 phases, smart card terminals, Public Key Infrastructure (PKI) integration with smart cards

UNIT V CLOUD DATA SECURITY AND AUDITING 9

Cloud Data Security: Recent trends in Database security and access control mechanisms. Cloud Data Audit: Intro, Audit, Best Practice, Key management, Cloud Key Management Audit.

TOTAL :45 PERIODS

COURSE OUTCOMES:

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

CO1: Explain core access control principles and threat assessment techniques.

C**O2:** Compare and evaluate DAC, MAC, ABAC, and related models.

C**O3:** Apply RBAC in enterprise systems and workflow management.

C**O4:** Describe smart card system design and security integration with PKI.

C**O5:** Analyze cloud security controls, audit processes, and key management.

TEXTBOOKS

1. Role Based Access Control: David F. Ferraiolo, D. Richard Kuhn, Ramaswamy Chandramouli.

REFERENCES

1. Ronald L. Krutz, Russell Dean Vines,
The CISSP Prep Guide: Mastering the Ten Domains of Computer Security,
Wiley, 2004, ISBN: 978-0471268026

CB1610A SOFTWARE TESTING AND AUTOMATION

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the basics of software testing
- To learn how to do the testing and planning effectively
- To build test cases and execute them
- To focus on wide aspects of testing and understanding multiple facets of testing
- To get an insight about test automation and the tools used for test automation

UNIT I FOUNDATIONS OF SOFTWARE TESTING **9**

Why do we test Software?, Black-Box Testing and White-Box Testing, Software Testing Life Cycle, V-model of Software Testing, Program Correctness and Verification, Reliability versus Safety, Failures, Errors and Faults (Defects), Software Testing Principles, Program Inspections, Stages of Testing: Unit Testing, Integration Testing, System Testing, Acceptance Testing .

UNIT II TEST PLANNING **9**

The Goal of Test Planning, High Level Expectations, Intergroup Responsibilities, Test Phases, Test Strategy, Resource Requirements, Tester Assignments, Test Schedule, Test Cases, Bug Reporting, Metrics and Statistics, Risk-Based Testing and Risk Management.

UNIT III TEST DESIGN AND EXECUTION **9**

Test Objective Identification, Test Design Factors, Requirement identification, Testable Requirements, Modeling a Test Design Process, Modeling Test Results, Boundary Value Testing, Equivalence Class Testing, Path Testing, Data Flow Testing, Test Design Preparedness Metrics, Test Case Design Effectiveness, Model-Driven Test Des.

UNIT IV ADVANCED TESTING CONCEPTS **9**

Performance Testing: Load Testing, Stress Testing, Volume Testing, Fail-Over Testing, Recovery Testing, Configuration Testing, Compatibility Testing, Usability Testing, Testing the Documentation, Security testing, Testing in the Agile Environment, Testing Web and Mobile Applications.

UNIT V TEST AUTOMATION AND TOOLS 9

Automated Software Testing, Automate Testing of Web Applications, Selenium: Introducing Web Driver and Web Elements, Locating Web Elements, Actions on Web Elements, Different Web Drivers, Understanding Web Driver Events, Testing: Understanding Testing.xml, Adding Classes, Packages, Methods to Test, Test Reports, Case Studies.

TOTAL :45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the basic concepts of software testing and the need for software testing

CO2: Design Test planning and different activities involved in test planning

CO3: Design effective test cases that can uncover critical defects in the application

CO4: Carry out advanced types of testing

CO5: Automate the software testing using Selenium and TestNG

TEXTBOOKS

1. Yogesh Singh, "Software Testing", Cambridge University Press, 2012
2. Unmesh Gundecha, Satya Avasarala, "Selenium WebDriver 3 Practical Guide" - Second Edition 2018
3. **"Foundations of Software Testing: ISTQB Certification" Authors**: Rex Black, Erik van Veenendaal, Dorothy Graham **Publisher**: Cengage Learning

REFERENCES

1. Glenford J. Myers, Corey Sandler, Tom Badgett, The Art of Software Testing, 3rd Edition, 2012, John Wiley & Sons, Inc.
2. Ron Patton, Software testing, 2nd Edition, 2006, Sams Publishing
3. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, Fourth Edition, 2014, Taylor & Francis Group.
4. Carl Cocchiaro, Selenium Framework Design in Data-Driven Testing, 2018, Packt Publishing.
5. Elfriede Dustin, Thom Garrett, Bernie Gaurf, Implementing Automated Software Testing, 2009, Pearson Education, Inc.
6. Satya Avasarala, Selenium WebDriver Practical Guide, 2014, Packt Publishing.
7. Varun Menon, TestNg Beginner's Guide, 2013, Packt Publishing.

CO's- PO's & PSO's MAPPING

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	1	3	-	2	-	-	-	-	-	-	-	1	-	2
2	2	3	-	2	-	-	-	-	-	-	-	2	-	3
3	2	2	1	2	1	-	-	-	-	-	-	1	1	2
4	2	2	1	3	-	-	-	-	-	-	-	1	-	1
5	1	1	2	2	3	-	-	-	-	-	-	2	2	1
AVg.	1.6	2.2	1.33333	2.2	2	-	-	-	-	-	-	1.4	1.5	1.8

1 - low, 2 - medium, 3 - high, '-' - no correlation

CB1611A OPERATING SYSTEMS AND SECURITY

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the basic concepts of Operating Systems.
- To explore the process management concepts including scheduling, synchronization, threads and deadlock.
- To understand the memory, file and I/O management activities of OS.
- To understand the requirements of a trust model.
- To learn how security is implemented in various operating systems.

UNIT I OPERATING SYSTEM OVERVIEW 9

Computer-System Organization – Architecture – Operating-System Operations – Resource Management – Security and Protection – Distributed Systems – Kernel Data Structures – Operating-System Services – System Calls – System Services – Why Applications Are Operating- System Specific – Operating-System Design and Implementation - Operating-System Structure – Building and Booting an Operating System .

UNIT II PROCESS MANAGEMENT 9

Process Concept – Process Scheduling – Operation on Processes, Inter-process Communication – Threads – Overview – Multithreading models – Threading issues; CPU Scheduling – Scheduling criteria, Scheduling algorithms; Process Synchronization – critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery.

UNIT III MEMORY MANAGEMENT AND FILE SYSTEMS 9

Test Objective Identification, Test Design Factors, Requirement identification, Testable Requirements, Modeling a Test Design Process, Modeling Test Results, Boundary Value Testing, Equivalence Class Testing, Path Testing, Data Flow Testing, Test Design Preparedness Metrics, Test Case Design Effectiveness, Model-Driven Test Design, Test Procedures, Test Case Organization and Tracking, Bug Reporting, Bug Life Cycle.

UNIT IV SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS 9

Security Goals – Trust and Threat Model – Access Control Fundamentals – Protection System – Reference Monitor – Secure Operating System Definition – Assessment Criteria – Information Flow – Information Flow Secrecy Models – Denning's Lattice Model – Bell LaPadula Model – Information Flow Integrity Models – Biba Integrity Model – Low-Water Mark Integrity – Clark- Wilson Integrity

UNIT V SECURITY IN OPERATING SYSTEMS 9

UNIX Security – UNIX Protection System – UNIX Authorization – UNIX Security Analysis – UNIX Vulnerabilities – Windows Security – Windows Protection System – Windows Authorization –

Windows Security Analysis – Windows Vulnerabilities – Address Space Layout Randomizations – Retrofitting Security into a Commercial Operating System – Introduction to Security Kernels

TOTAL :45 PERIODS

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

COURSE OUTCOMES:

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

CO1: To gain understanding on the concepts of Operating Systems.

CO2: To acquire knowledge on process management concepts including scheduling, synchronization, threads and deadlock.

CO3: To have understanding on memory, file and I/O management activities of OS.

CO4: To understand security issues in operating systems and appreciate the need for security models

CO5: To gain exposure to the operating systems security models of WINDOWS and UNIX OS.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons, Inc., 10th Edition, 2021.

2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.

REFERENCES:

1. Morrie Gasser, "Building A Secure Computer System", Van Nostrand Reinhold, New York, 1988.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.
3. William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Pearson, 2017.
4. Michael Palmer, "Guide to Operating Systems Security", Course Technology – Cengage Learning, New Delhi, 2008.
5. Introduction to Hardware, Security and Trust, book by Mohammad Tehranipoor, Cliff Wang, Springer, 2012.
6. Gary McGraw, Software Security: Building Security In, Addison Wesley software security series, 2005.
7. Gerardus Blokdyk, Security Focused Operating System A Complete Guide - 2020 Edition, 5STARCooks, ISBN: 9781867373353, 2020.

CO's- PO's & PSO's MAPPING

CO's	PO's												PSO's	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	3	3	3	3	2	1	1	1	1	2	3	2	3
2	3	3	3	3	2	1	1	1	1	1	2	3	1	2
3	3	3	3	3	2	2	1	1	1	1	2	3	2	3
4	3	3	3	3	1	1	1	1	1	1	1	2	1	3
5	3	3	3	3	1	2	1	1	1	1	1	2	1	2
AVg.	3	3	3	3	3	2	1	1	1	1	2	3	2	3

1 - low, 2 - medium, 3 - high, '-' - no correlation

PROFESSIONAL ELECTIVES – II

CB1705A INFORMATION THEORY FOR CYBER SECURITY L T P C

3 0 0 3

COURSE OBJECTIVES:

- Introduce foundational concepts of information theory and their application in cryptographic security.
- Explore secrecy mechanisms and coding techniques for secure data transmission. Identify different storage virtualization technologies
- Understand cryptographic protocols and analyze cybersecurity threats
- Examine advanced secrecy metrics and secure source coding techniques.
- Apply cryptographic methods and forensics in real-world cybersecurity and legal contexts.

UNIT I FOUNDATIONS OF INFORMATION THEORY AND CRYPTOGRAPHIC SECURITY 9

Shannon's foundation of Information theory, Random variables, Probability distribution factors, Uncertainty/entropy information measures, Leakage, Quantifying Leakage and Partitions, Lower bounds on key size: secrecy, authentication and secret sharing. provable security, computationally-secure, symmetric cipher, Mathematical Preliminaries.

UNIT II SECRECY MECHANISMS AND CODING TECHNIQUES 9

Secrecy, Authentication, Secret sharing, Optimistic results on perfect secrecy, Secret key agreement, Unconditional Security, Quantum Cryptography, Randomized Ciphers, Types ofcodes: blockcodes,HammingandLeemetrics,descriptionoflinearblockcodes,parity check Codes, cyclic code, Masking techniques, Communication Channels

UNIT III CRYPTOGRAPHIC PROTOCOLS AND SECURITY THREATS 9

Information-theoretic security and cryptograph, basic introduction to Diffie-Hellman, AES, and side-channel attacks, Cyber Security Threats and Attacks.

UNIT IV ADVANCED SECRECY METRICS AND SECURE CODING 9

Secrecy metrics: strong, weak, semantic security, partial secrecy, Secure source coding: rate-distortion theory for secrecy systems, side information at receivers, Differential privacy, Distributed channel synthesis

UNIT V APPLIED CRYPTOGRAPHY AND FORENSICS 9

Digital and network forensics, Public Key Infrastructure, Light weight cryptography, Elliptic Curve Cryptography and applications, Cyber Laws and Ethics.

COURSE OUTCOMES:

CO1: Understand the fundamental concepts of information theory and their role in cryptographic security.
CO2: Apply secrecy mechanisms and coding techniques to ensure secure data transmission.
CO3: Analyze cryptographic protocols and assess security threats including side-channel attacks.

CO4: Evaluate secrecy metrics and implement secure coding schemes using privacy-preserving techniques.

CO5: Demonstrate knowledge of applied cryptography, digital forensics, and legal frameworks in cybersecurity.

TOTAL: 45 PERIODS

TEXTBOOKS

1.Information Theory and Coding, Muralidhar Kulkarni, K S Shivaprakasha, John Wiley & Sons.

2.Communication Systems: Analog and digital, Singh and Sapre, Tata Mc Graw Hill.

3.Fundamentals in information theory and coding, Monica Borda, Springer.

REFERENCES

2. Information Theory, Coding and Cryptography R Bose.
3. Information Security & Cyber Laws, Gupta & Gupta, Khanna Publishing House.
4. Multi-media System Design,Prabhat K And leighand Kiran Thakrar

CB1706A STORAGE TECHNOLOGIES L T P C

3 0 0 3

COURSE OBJECTIVES:

- Characterize the functionalities of logical and physical components of storage
- Describe various storage networking technologies
- Identify different storage virtualization technologies
- Discuss the different backup and recovery strategies
- Understand common storage management activities and solutions

UNIT I STORAGE SYSTEMS 9

Introduction to Information Storage: Digital data and its types, Information storage, Key characteristics of data center and Evolution of computing platforms. Information Life cycle Management. Third Platform Technologies: Cloud computing and its essential characteristics, Cloud services and cloud deployment models, Big data analytics, Social networking and mobile computing, Characteristics of third platform infrastructure and Imperatives for third platform transformation. Data Center Environment: Building blocks of a data center, Compute systems and computer virtualization and Software-defined data center.

UNIT II INTELLIGENT STORAGE SYSTEMS AND RAID 5

Components of an intelligent storage system, Components, addressing, and performance of hard disk drives and solid-state drives, RAID, Types of intelligent storage systems, Scale-up and scale-out storage Architecture**.**

UNIT III STORAGE NETWORKING TECHNOLOGIES AND VIRTUALIZATION 13

Block-Based Storage System, File-Based Storage System, Object-Based and Unified Storage. Fibre Channel SAN: Software-defined networking, FC SAN components and architecture, FC SAN topologies, link aggregation, and zoning, Virtualization in FC SAN environment. Internet Protocol SAN: iSCSI protocol, network components, and connectivity, Link aggregation, switch aggregation, and VLAN, FCIP protocol, connectivity, and configuration. Fibre Channel over Ethernet SAN:

Components of FCoE SAN, FCoE SAN connectivity, Converged Enhanced Ethernet, FCoE architecture.

UNIT IV BACKUP, ARCHIVE AND REPLICATION 12

Introduction to Business Continuity, Backup architecture, Backup targets and methods, Data deduplication, Cloud-based and mobile device backup, Data archive, Uses of replication and its characteristics, Compute based, storage-based, and network-based replication, Data migration,Disaster Recovery as a Service (DRaaS)**.**

UNIT V SECURING STORAGE INFRASTRUCTURE 6

Information security goals, Storage security domains, Threats to a storage infrastructure, Security controls to protect a storage infrastructure, Governance, risk, and compliance, Storage infrastructure management functions, Storage infrastructure management processes.

COURSE OUTCOMES:

CO1: Demonstrate the fundamentals of information storage management and various models of Cloud infrastructure services and deployment

CO2: Illustrate the usage of advanced intelligent storage systems and RAID

CO3: Interpret various storage networking architectures - SAN, including storage subsystems and virtualization

CO4: Examine the different role in providing disaster recovery and remote replication technologies

CO5: Infer the security needs and security measures to be employed in information storage management

TOTAL: 45 PERIODS

TEXTBOOKS

1. EMC Corporation, Information Storage and Management, Wiley, India

2. Jon Tate, Pall Beck, Hector Hugo Ibarra, Shanmuganathan Kumaravel and Libor Miklas, Introduction to Storage Area Networks, Ninth Edition, IBM - Redbooks, December 2017

3. Ulf Troppens, Rainer Erkens, Wolfgang Mueller-Friedt, Rainer Wolafka, Nils Haustein ,Storage Networks Explained, Second Edition, Wiley, 2009

CO's- PO's & PSO's MAPPING

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	3	3	2	-	-	-	1	-	-	2	3	-
2	3	1	2	2	3	-	-	-	2	-	-	3	2	1
3	1	2	2	3	2	-	-	-	1	-	-	2	2	2
4	2	3	2	2	3	-	-	-	2	-	-	2	3	-
5	2	2	3	1	2	-	-	-	3	-	-	2	3	1
AVg.	2	2	2.4	2.2	2.4	-	-	-	1.8	-	-	2.2	2.6	1.33333

1 - low, 2 - medium, 3 - high, '-' - no correlation

CB1707A SECURITY AND PRIVACY IN CLOUD L T P C

3 0 3 3

COURSE OBJECTIVES:

- To Introduce Cloud Computing terminology, definition & concepts

- To understand the security design and architectural considerations for Cloud
- To understand the Identity, Access control in Cloud
- To follow best practices for Cloud security using various design patterns
- To be able to monitor and audit cloud applications for security

UNIT I FUNDAMENTALS OF CLOUD SECURITY CONCEPTS 9

Overview of cloud security- Security Services - Confidentiality, Integrity, Authentication, Non-repudiation, Access Control - Basic of cryptography - Conventional and public-key cryptography, hash functions, authentication, and digital signatures, Case Studies.

UNIT II SECURITY DESIGN AND ARCHITECTURE FOR CLOUD 9

Security design principles for Cloud Computing - Comprehensive data protection - End-to-end access control - Common attack vectors and threats - Network and Storage - Secure Isolation Strategies - Virtualization strategies - Inter-tenant network segmentation strategies - Data Protection strategies: Data retention, deletion and archiving procedures for tenant data, Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key, case studies.

UNIT III ACCESS CONTROL AND IDENTITY MANAGEMENT 9

Access control requirements for Cloud infrastructure - User Identification - Authentication and Authorization - Roles-based Access Control - Multi-factor authentication - Single Sign-on, Identity Federation - Identity providers and service consumers - Storage and network access control options - OS Hardening and minimization - Verified and measured boot - Intruder Detection and prevention.

UNIT IV CLOUD SECURITY DESIGN PATTERNS 9

Introduction to Design Patterns, Cloud bursting, Geo-tagging, Secure Cloud Interfaces, Cloud Resource Access Control, Secure On-Premise Internet Access, Secure External Cloud, Case Studies.

UNIT V MONITORING, AUDITING AND MANAGEMENT 9

Proactive activity monitoring - Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges - Events and alerts - Auditing – Record generation, Reporting and Management, Tamper-proofing audit logs, Quality of Services, Secure Management, User management, Identity management, Security Information and Event Management, Case Studies.

COURSE OUTCOMES:

CO1: Understand the cloud concepts and fundamentals.
CO2: Explain the security challenges in the cloud.
CO3: Define cloud policy and Identity and Access Management.
CO4: Understand various risks and audit and monitoring mechanisms in the cloud.
CO5: Define the various architectural and design considerations for security in the cloud.

TOTAL:45 PERIODS

TEXTBOOKS

1. Raj Kumar Buyya , James Broberg, andrzejGoscinski, “Cloud Computing:”, Wiley 2013
2. Dave shackleford, “Virtualization Security”, SYBEX a wiley Brand 2013.
3. Mather, Kumaraswamy and Latif, “Cloud Security and Privacy”, OREILLY 2011

REFERENCES

1. Mark C. Chu-Carroll ―Code in the Cloud‖,CRC Press, 2011

2. Mastering Cloud Computing Foundations and Applications Programming
RajkumarBuyya, Christian Vechhiola, S. ThamaraiSelvi

CO's- PO's & PSO's MAPPING

CO's	PO's												PSO's	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	3	3	1	2	-	-	-	1	1	1	3	3	1
2	1	3	2	3	1	-	-	-	2	2	3	2	3	1
3	3	2	2	3	2	-	-	-	3	1	1	2	2	3
4	2	1	2	3	3	-	-	-	3	2	3	3	1	1
5	1	3	3	1	1	-	-	-	2	3	3	2	2	3
AVg.	2	2.4	2.4	2.2	1.8	-	-	-	2.2	1.8	2.2	2.4	2.2	1.8

1 - low, 2 - medium, 3 - high, '-' - no correlation

CB1708A NEURAL NETWORKS AND DEEP LEARNING L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the basics in deep neural networks
- To understand the basics of associative memory and unsupervised learning networks
- To apply CNN architectures of deep neural networks
- To analyze the key computations underlying deep learning, then use them to build and train deep neural networks for various tasks.
- To apply autoencoders and generative models for suitable applications.

UNIT I INTRODUCTION 9

Neural Networks-Application Scope of Neural Networks-Artificial Neural Network: An Introduction- Evolution of Neural Networks-Basic Models of Artificial Neural Network- Important Terminologies of ANNs-Supervised Learning Network, Case Studies.

UNIT II ASSOCIATIVE MEMORY AND UNSUPERVISED LEARNING NETWORKS 9

Training Algorithms for Pattern Association-Autoassociative Memory Network-Heteroassociative Memory Network-Bidirectional Associative Memory (BAM)-Hopfield Networks-Iterative Autoassociative Memory Networks-Temporal Associative Memory Network-Fixed Weight Competitive Nets-Kohonen Self-Organizing Feature Maps-Learning Vector Quantization-Counter propagation Networks-Adaptive Resonance Theory Network, Case Studies.

UNIT III THIRD-GENERATION NEURAL NETWORKS 9

Spiking Neural Networks-Convolutional Neural Networks-Deep Learning Neural Networks-Extreme Learning Machine Model-Convolutional Neural Networks: The Convolution Operation – Motivation – Pooling – Variants of the basic Convolution Function – Structured Outputs – Data Types – Efficient Convolution Algorithms – Neuroscientific Basis – Applications: Computer Vision, Image Generation, Image Compression, Case Studies.

UNIT IV DEEP FEEDFORWARD NETWORKS 9

History of Deep Learning- A Probabilistic Theory of Deep Learning- Gradient Learning – Chain Rule and Backpropagation - Regularization: Dataset Augmentation – Noise Robustness -Early Stopping, Bagging and Dropout - batch normalization- VC Dimension and Neural Nets,

UNIT V RECURRENT NEURAL NETWORKS 6

Recurrent Neural Networks: Introduction – Recursive Neural Networks – Bidirectional RNNs – Deep Recurrent Networks – Applications: Image Generation, Image Compression, Natural Language Processing. Complete Auto encoder, Regularized Autoencoder, Stochastic Encoders and Decoders, Contractive Encoders.

TOTAL:45 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to: CO1:

Apply Convolution Neural Network for image processing.

CO2: Understand the basics of associative memory and unsupervised learning networks.

CO3: Apply CNN and its variants for suitable applications.

CO4: Analyze the key computations underlying deep learning and use them to build and train deep neural networks for various tasks.

CO5: Apply autoencoders and generative models for suitable applications.

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.
2. Francois Chollet, "Deep Learning with Python", Second Edition, Manning Publications, 2021.

REFERENCES:

1. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and TensorFlow", Oreilly, 2018.
2. Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", O'Reilly Media, 2017.
3. Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", Springer International Publishing, 1st Edition, 2018.
4. Learn Keras for Deep Neural Networks, Jojo Moolayil, Apress,2018
5. Deep Learning Projects Using TensorFlow 2, Vinita Silaparasetty, Apress, 2020
6. Deep Learning with Python, FRANÇOIS CHOLLET, MANNING SHELTER ISLAND,2017.
7. S Rajasekaran, G A Vijayalakshmi Pai, "Neural Networks, FuzzyLogic and Genetic Algorithm, Synthesis and Applications", PHI Learning, 2017.
8. Pro Deep Learning with TensorFlow, Santanu Pattanayak, Apress,2017
9. James A Freeman, David M S Kapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Addison Wesley, 2003.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	2	3	2	3	1	-	-	2	1	-	-	2	2
2	3	1	2	1	-	-	-	-	-	1	2	2	-	1
3	3	3	3	3	3	1	-	-	2	1	-	-	2	2
4	3	3	3	3	3	-	-	-	2	-	2	3	2	2
5	1	1	3	2	3	-	-	-	2	-	-	-	1	1
AVg.	2.6	2	2.8	2.2	2.4	0.4	0	0	1.6	0.6	0.8	1	1.4	1.6

10. **1 - low, 2 - medium, 3 - high, '-' - no correlation**

CB1709A **PRINCIPLES OF SECURE CODING** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- Identify and analyze security problems and their vulnerabilities in software.
- Understand the various static analysis methods for secure programming.
- Understand the different secure coding techniques for handling inputs, errors, integer and string operations in a software.
- Effectively apply their knowledge to write a secure web application

UNIT I SOFTWARE SECURITY 8

Security Concepts, Security Policy, Security Flaws, Vulnerabilities, Exploitation and Mitigations. Software Security problems, Classification of Vulnerabilities.

UNIT II STATIC ANALYSIS 7

Problem Solving with static analysis: Type Checking, Style Checking, Program understanding, verifications and property checking, Bug finding and Security Review.

UNIT III STRINGS AND INTEGER SECURITY 10

Strings: Common String manipulating Errors, String Vulnerabilities and Exploits, Mitigation Strategies for strings, String handling functions, Runtime protecting strategies, Dynamic Memory Management: Memory Management errors in C and C++ , Notable Vulnerabilities. Integer Security: Integer data Type, Integer Conversions, Integer Operations, Integer Vulnerabilities, Mitigation Strategies.

UNIT IV HANDLING INPUTS AND EXCEPTIONS 10

Handling Inputs: What to validate, How to validate, Preventing metadata Vulnerabilities, Buffer Overflow: Introduction, Exploiting buffer overflow vulnerabilities, Buffer allocation strategies, Tracking buffer sizes, buffer overflow in strings, Buffer overflow in Integers Runtime Protections. Errors and Exceptions: Handling Error with return code, Managing exceptions, Preventing Resource leaks, Logging and debugging.

UNIT V SECURE WEB APPLICATIONS 10

Input and Output Validation for the Web: Browser Subverted, HTTP Considerations: Use POST, Not GET, Request Ordering, Error Handling, Request Provenance. Maintaining Session State: Use Strong Session Identifiers, Enforce a Session Idle Timeout and a Maximum Session Lifetime, Begin a New Session upon Authentication.

COURSE OUTCOMES:

CO1: Apply secure coding practices when developing a software.
CO2: Understand and perform a static analysis and security review of a software code.
CO3: Evaluate strings and integer vulnerabilities in a software code.
CO4: Handle inputs, overflow mechanisms, errors and exceptions in a software code.
CO5: Design a secure web application by performing input and output validation techniques on the web.

TOTAL: 45 PERIODS

REFERENCES

1. Seacord, R. C., Secure Coding in C and C++, AddisonWesley, Software Engineering Institute, 2nd edition, 2013. (UNIT- III)
2. Chess, B., and West, J., Secure Programming with Static Analysis, Addison Wesley Software Security Series, 2007. (UNIT-II,IV,V)
3. Seacord, R. C., The CERT C Secure Coding Standard, Pearson Education, 2009.
4. Howard, M., LeBlanc, D., Writing Secure Code, 2nd Edition. Pearson Education, 2002.

CO-PO Mapping

CO	POs					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
1	3	2	3	-	2	
2	2		-	3		2
3	3	2	3	-	2	
4	2		-	3		-
5	3	2	1	-	2	
Avg	2.6	2	2.333333	3	2	2

PROFESSIONAL ELECTIVES-III

CB1802A **MODERN CRYPTOGRAPHY** **L T P C**

3 0 3 3

COURSE OBJECTIVES:

- To learn about Modern Cryptography.
- To focus on how cryptographic algorithms and protocols work and how to use them.
- To build a Pseudorandom permutation.
- To construct Basic cryptanalytic techniques.
- To provide instruction on how to use the concepts of block ciphers and message authentication codes.

UNIT I INTRODUCTION **9**

Basics of Symmetric Key Cryptography, Basics of Asymmetric Key Cryptography, Hardness of Functions. Notions of Semantic Security (SS) and Message Indistinguishability (MI): Proof of Equivalence of SS and MI, Hard Core Predicate, Trap-door permutation, Goldwasser-Micali Encryption. Goldreich-Levin Theorem: Relation between Hardcore Predicates and Trap-door permutations, Case Studies.

UNIT II FORMAL NOTIONS OF ATTACKS **9**

Attacks under Message Indistinguishability: Chosen Plaintext Attack (IND-CPA), Chosen Ciphertext Attacks (IND-CCA1 and IND-CCA2), Attacks under Message Non-malleability: NM-CPA and NM-CCA2, Inter-relations among the attack model, Case Studies.

UNIT III RANDOM ORACLES **9**

Provable Security and asymmetric cryptography, hash functions. One-way functions: Weak and Strong one-way functions. Pseudo-random Generators (PRG): Blum-Micali-Yao Construction, Construction of more powerful PRG, Relation between One-way functions and PRG, Pseudo- random Functions (PRF), Case Studies.

UNIT IV BUILDING A PSEUDORANDOM PERMUTATION **9**

The LubyRackoff Construction: Formal Definition, Application of the LubyRackoff Construction to the construction of Block Ciphers, The DES in the light of LubyRackoff Construction, Case Studies.

UNIT V MESSAGE AUTHENTICATION CODES **9**

Left or Right Security (LOR). Formal Definition of Weak and Strong MACs, Using a PRF as a MAC, Variable length MAC. Public Key Signature Schemes: Formal Definitions, Signing and Verification, Formal Proofs of Security of Full Domain Hashing. Assumptions for Public Key Signature Schemes: One-way functions Imply Secure One-time Signatures. Shamir's Secret Sharing Scheme. Formally Analyzing Cryptographic Protocols. Zero Knowledge Proofs and Protocols, Case Studies.

COURSE OUTCOMES:

CO1: Interpret the basic principles of cryptography and general cryptanalysis.

CO2: Determine the concepts of symmetric encryption and authentication.

CO3 Identify the use of public key encryption, digital signatures, and key establishment.

CO4: Articulate the cryptographic algorithms to compose, build and analyze simple cryptographic

solutions.

CO5: Express the use of Message Authentication Codes.

TOTAL:45 PERIODS

TEXT BOOKS:

1. Hans Delfs and Helmut Knebl, Introduction to Cryptography: Principles and Applications, Springer Verlag.
2. Wenbo Mao, Modern Cryptography, Theory and Practice, Pearson Education (Low Priced Edition)

REFERENCES:

1. 1.ShaffiGoldwasser and MihirBellare, Lecture Notes on Cryptography, Available at http://citeseerx.ist.psu.edu/.
2. 2.OdedGoldreich, Foundations of Cryptography, CRC Press (Low Priced Edition Available), Part 1 and Part 23
3. 3.William Stallings, "Cryptography and Network Security: Principles and Practice", PHI 3rd Edition, 2006.

CB1803A DATA WAREHOUSING L T P C

3 0 3 3

COURSE OBJECTIVES:

- To know the details of data warehouse Architecture
- To understand the OLAP Technology
- To understand the partitioning strategy
- To differentiate various schema
- To understand the roles of process manager & system manager

UNIT I INTRODUCTION TO DATA WAREHOUSE 9

Data warehouse Introduction - Data warehouse components- operational database Vs data warehouse – Data warehouse Architecture – Three-tier Data Warehouse Architecture - Data Warehouse Development Life Cycle, Autonomous Data Warehouse- Autonomous Data Warehouse Vs Snowflake - Modern Data Warehouse, Comparison of Data Warehousing Approaches: Inmon vs Kimball.

UNIT II ETL AND OLAP TECHNOLOGY 9

What is ETL – ETL Vs ELT – Types of Data warehouses - Data warehouse Design and Modeling - Delivery Process - Online Analytical Processing (OLAP) - Characteristics of OLAP - OLAP Server Architectures, Online Transaction Processing (OLTP) Vs OLAP - OLAP operations- Types of OLAP- ROLAP Vs MOLAP Vs HOLAP, ETL Data Quality and Error Handling Techniques.

UNIT III META DATA, DATA MART AND PARTITION STRATEGY 9

Meta Data – Categories of Metadata – Role of Metadata – Metadata Repository – Challenges for Meta Management - Data Mart – Need of Data Mart- Cost Effective Data Mart- Designing Data Marts- Cost of Data Marts- Partitioning Strategy – Vertical partition – Normalization – Row Splitting – Horizontal Partition, Kimball's Bus Architecture and Conformed Dimensions, Metadata Standards and Interoperability.

UNIT IV DIMENSIONAL MODELING AND SCHEMA 9

Dimensional Modeling- Multi-Dimensional Data Modeling – Slowly Changing Dimensions (SCD) Types 1, 2, and 3 - Data Cube- Star Schema- Snowflake schema- Star Vs Snowflake schema- Fact constellation Schema- Schema Definition - Process Architecture- Types of Data Base Parallelism – Datawarehouse Tools, Fact Table Granularity and Additivity.

UNIT V SYSTEM & PROCESS MANAGERS 6

Data Warehousing System Managers: System Configuration Manager- System Scheduling Manager - System Event Manager - System Database Manager - System Backup Recovery Manager - Data Warehousing Process Managers: Load Manager – Warehouse Manager- Query Manager – Tuning – Testing, Performance Optimization Techniques in Data Warehousing, Warehouse Security and User Access Control.

TOTAL :45 PERIODS

COURSE OUTCOMES:

At the end of the course the students should be able to

CO1: Design data warehouse architecture for various Problems

CO2: Apply the OLAP Technology

CO3: Analyse the partitioning strategy

CO4: Critically analyze the differentiation of various schema for given problem

CO5: Frame roles of process manager & system manager

TEXT BOOKS

1. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
2. Ralph Kimball, “The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling”, Third edition, 2013.

REFERENCES

1. Paul Raj Ponniah, “Data warehousing fundamentals for IT Professionals”, 2012.
2. K.P. Soman, ShyamDiwakar and V. Ajay “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.

CO’s-PO’s & PSO’s MAPPING

CO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	3	3	3	2	2	-	-	-	3	-	-	3
2	3	2	2	2	3	-	-	-	2	-	2	2
3	3	3	3	3	-	-	-	-	-	-	-	3
4	3	3	3	3	-	-	-	-	-	-	-	3
5	3	2	2	2	-	2	-	-	-	-	2	2
AVg.	3	2.6	2.6	1.2	2.5	1	-	-	2.5	-	2	2.6

1 - low, 2 - medium, 3 - high, ‘-' - no correlation

CB1804A **UI AND UX DESIGN** **L T P C**

3 0 3 3

COURSE OBJECTIVES:

- To provide a sound knowledge in UI & UX
- To understand the need for UI and UX
- To understand the various Research Methods used in Design
- To explore the various Tools used in UI & UX
- Creating a wireframe and prototype

UNIT I FOUNDATIONS OF DESIGN 9

UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy - The UX Loop: Learn → Make → Test - Hick's Law in Design Thinking.

UNIT II FOUNDATIONS OF UI DESIGN 9

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides, Color, Typography, and Spacing Basics for UI - Fitts's Law and UI Element Placement.

UNIT III FOUNDATIONS OF UX DESIGN 9

Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals, Color, Typography, and Spacing Basics for UI, The UX Spectrum: From Research to Strategy, Jakob's Law of Familiarity in UX.

UNIT IV WIREFRAMING, PROTOTYPING AND TESTING 9

Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools- Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration, Sketching and Wireframing Tips for Beginners, The Principle of Least Effort in Usability Testing.

UNIT V RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE 9

Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams - Flow Mapping - Information Architecture, Creating Personas and Mapping User Journeys, Miller's Law and Information Architecture.

45 PERIODS

COURSE OUTCOMES:

On completion of the course, the students will be able to:

CO1: Build UI for user Applications

CO2: Evaluate UX design of any product or application

CO3: Demonstrate UX Skills in product development

CO4 Implement Sketching principles

CO5 Create Wireframe and Prototype

TEXT BOOKS

1. Joel Marsh, "UX for Beginners", O'Reilly , 2022
2. Jon Yablonski, "Laws of UX using Psychology to Design Better Product & Services" O'Reilly 2021

REFERENCES

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, "Designing Interface" 3 rd Edition , O'Reilly 2020
2. Steve Schoger, Adam Wathan "Refactoring UI", 2018
3. Steve Krug, "Don't Make Me Think, Revisited: A Commonsense Approach to Web & Mobile", Third Edition, 2015
4. https://www.nngroup.com/articles/
5. https://www.interaction-design.org/literature.

CO's- PO's & PSO's MAPPING

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	3	1	2	1	-	-	-	2	-	2	2	3	1
2	3	3	3	2	-	-	-	-	1	-	1	2	3	2
3	3	2	2	1	1	-	1	1	2	-	1	2	3	1
4	3	2	3	2	2	-	1	-	2	-	3	3	3	2
5	2	3	3	2	3	-	-	2	3	-	2	3	3	1
AVg.	2.6	2.6	2.4	1.8	1.75	-	1	1.5	2	-	1.8	2.4	3	1.4

6. **1 - low, 2 - medium, 3 - high, '-' - no correlation**

CB1805A NETWORK SECURITY L T P C
3 0 0 3

COURSE OBJECTIVES:

To learn the fundamentals of cryptography and its application to network security.
To understand the mathematics behind cryptography.
To learn about the security issues in internet protocol.
To understand the security issues in other layers
To study about intrusion detection and prevention system and wireless hacking.

UNIT I INTRODUCTION TO NETWORK SECURITY 9

Security Services and Mechanisms – Vulnerabilities in wireless communications –security basics – Attack and its types Security essentials on layers - Electronic signatures – PKI and electronic certificate

UNIT II SYMMETRIC AND ASYMMETRIC CIPHERS 9

Classical Techniques – Substitution Ciphers - Transposition Ciphers. Modern symmetric ciphers : Stream cipher - RC4, Block cipher - DES – AES – Uses of Modes of operation. Modern Asymmetric block ciphers - RSA, ElGamal., MAC – Cryptographic Hash Functions- Key management system- Key Distribution & Key Agreements.

UNIT III SECURITY ISSUES IN INTERNET PROTOCOL 9

Reconnaissance-Wireshark- TCPDump - Netdiscover - Shodan ,NESSUS,Hping3 NSE Scripts: Introduction - How to write and read NSE script - TCP session Hijacking - UDP session Hijacking -HTTP Session – Hijacking - Spoofing basics - IP, DNS and ARP Spoofing

UNIT IV SECURITY IN OTHER LAYERS 9

EMail Security and its services – PGP - S/MIME – DNS Security - VPN Concept and its configuration - AAA Concept, RADIUS, TACACS+ technologies, SSL architecture and protocol.

UNIT V INTRUSION DETECTION AND PREVENTION SYSTEM(IDPS) AND WIRELESS HACKING 9

IDPS introduction - Uses of IDPS Technologies - Key functions of IDPS Technologies , Signature Based Detection , Anomaly Based Detection - Wireless networks - WPA Handshaking - Wireless hacking tools.

COURSE OUTCOMES:

CO1: To design cryptographic algorithms and carry out their implementation.

CO2: To carry out cryptanalysis on cipher.

CO3: To be able to design and implement security based internet protocols.

CO4: To carry out system security for other layers.

To understand the importance of intrusion detection and prevention system and wireless hacking.

TOTAL: 45 PERIODS

REFERENCES

1. Behrouz A. Ferouzan, Debdeep Mukhopadhyay ―Cryptography & Network Security, 3rd edition, Tata McGraw Hill, 2015.
2. William Stallings “Network Security Essentials Applications and Standards", Pearson Education., 5th Edition, 2014.
3. Ryan Russell, " Hack Proofing your network ", Wiley,2nd Edition,2002.
4. David M. Durton, “Elementary Number Theory”, Tata Mcgraw Hill, Sixth Edition, 2009.

Jonathan Katz, Yehuda Lindell, "Introduction to Modern Cryptography: Principles and Protocols (Chapman & Hall/CRC Cryptography and Network Security Series)", 1st Edition ,CRC Press Taylor and Francis Group, 2008.

6. Douglas R. Stinson," Cryptography: Theory and Practice, Third Edition (Discrete Mathematics and Its Applications), Chapman & Hall/CRC, 2005.

CO-PO Mapping

CO	POs					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
1	3	2			2	1
2	2		3	-	-	2
3	2	2	-	3	2	

4	2		3	-	-	2
5	1	3	-	2	-	3
Avg	2	2.333333	3	2.5	2	2

CB1807A STEGANOGRAPHY AND DIGITAL WATERMARKING L T P C
3 0 0 3

COURSE OBJECTIVES:

- Understand the fundamental principles, history, and evolution of steganography and watermarking.
- Explore various frameworks and algorithmic approaches for secret communication using steganography..
- Examine different steganographic techniques and their effectiveness in various media formats.
- Learn detection, distortion, and steg analysis techniques to uncover hidden information.
- Study the principles, classification, and techniques of digital watermarking and its applications in authentication and copyright protection.

UNIT I INTRODUCTION TO STEGANOGRAPHY AND STEGANALYSIS 9

Overview, History, Methods for hiding (text, images ,audio ,video ,speech etc.).Steganalysis:ActiveandMaliciousAttackers,ActiveandpassiveSteganalysis, Mimicry and Obfuscation Techniques, Information Hiding in Synthetic Worlds, Steganographic Communication in Network Protocols

UNIT II FRAMEWORKS AND ALGORITHMS FOR SECRET COMMUNICATION 9

Frameworks for secret communication (pure steganography, secretkey, publickey steganography), Steganography algorithms (adaptive and non-adaptive), Public Key Steganography, Steganographic File Systems, Steganographic Embedding in Compressed Domains.

UNIT III STEGANOGRAPHY TECHNIQUES 9

Steganography techniques: Substitution systems, Spatial Domain, transform domain techniques, Spread spectrum, Statistical steganography, Transform Domain Techniques: DCT and Wavelet-Based Methods, Statistical Steganography and Detection, Spread Spectrum Steganography

UNIT IV DETECTION AND DISTORTION TECHNIQUES 9

Detection,Distortion,Techniques:LSBEmbedding,LSBSteganalysisusingprimarysets,Steganalysis Techniques for JPEG Images, Machine Learning Approaches in Steganalysis, Robustness and Security Measures in Steganography.

UNIT V WATERMARKING CONCEPTS AND TECHNIQUES 9

Introduction, Difference between Watermarking and Steganography, Classification (Characteristics and Applications),typesandtechniques(Spatial-domain,Frequency-domain,andVectorquantization- based watermarking), Watermark security & authentication, Watermarking with Side Information, Quantization Index Modulation (QIM) Techniques, Dirty Paper Coding in Watermarking

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COURSE OUTCOMES:

CO1: Describe and explain the core concepts of steganography and its historical development.
CO2: Analyze steganographic techniques for various media types including text, images, audio, and video..
CO3: Analyze cryptographic protocols and assess security threats including side-channel attacks.
CO4: Apply frameworks for secure communication using pure, secret-key, and public-key steganography.
CO5: Understand and apply detection and steganalysis methods such as LSB analysis and machine learning-based methods.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Peter Wayner, "Disappearing Cryptography – Information Hiding: Steganography & Watermarking", Morgan Kaufmann Publishers, New York, 2002.
2. Ingemar J. Cox, Matthew L. Miller, Jeffrey A. Bloom, Jessica Fridrich, TonKalker, "Digital Watermarking and Steganography", Margan Kaufmann Publishers, New York, 2008.

REFERENCES

1. Information Hiding: Steganography and Watermarking-Attacks and Countermeasures by Neil F. Johnson, Zoran Duric, Sushil Jajodia.
2. Information Hiding Techniques for Steganography and Digital Watermarking by Stefan Katzenbeisser, Fabien A. P. Petitcolas.

CO-PO Mapping

CO	POs					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
1	2					3
2	3	2	3		2	1
3	3	2	3		2	1
4	2			3		2
5	2				3	
Avg	2.4	2	3	3	2.333333	1.75

CB1806A **SECURITY PRACTICES** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To learn the core fundamentals of system and web security concepts
- To have through understanding in the security concepts related to networks
- To deploy the security essentials in IT Sector
- To be exposed to the concepts of Cyber Security and cloud security
- To perform a detailed study of Privacy and Storage security and related Issues

UNIT I SYSTEM SECURITY 9

Model of network security – Security attacks, services and mechanisms – OSI security architecture - A Cryptography primer- Intrusion detection system- Intrusion Prevention system - Security web applications- Case study: OWASP - Top 10 Web Application Security Risks.

UNIT II NETWORK SECURITY 9

Internet Security - Intranet security- Local Area Network Security - Wireless Network Security - Wireless Sensor Network Security- Cellular Network Security - Mobile security - IOT security - Case Study - Kali liunx.

UNIT III SECURITY MANAGEMENT 9

Information security essentials for IT Managers- Security Management System - Policy Driven System Management- IT Security - Online Identity and User Management System. Case study: Metasploit

UNIT IV CYBER SECURITY AND CLOUD SECURITY 9

Cyber Forensics- Disk Forensics – Network Forensics – Wireless Forensics – Database Forensics – Malware Forensics – Mobile Forensics – Email Forensics- Best security practices for automate Cloud infrastructure management – Establishing trust in IaaS, PaaS, and SaaS Cloud types. Case study: DVWA

UNIT V PRIVACY AND STORAGE SECURITY 9

Privacy on the Internet - Privacy Enhancing Technologies - Personal privacy Policies - Detection of Conflicts in security policies- privacy and security in environment monitoring systems. Storage Area Network Security - Storage Area Network Security Devices - Risk management - Physical Security Essentials.

COURSE OUTCOMES:

CO1: Understand the core fundamentals of system security **CO2:**
Apply the security concepts to wired and wireless networks **CO3:**
Implement and Manage the security essentials in IT Sector
CO4: Explain the concepts of Cyber Security and Cyber forensics
CO5: Be aware of Privacy and Storage security Issues.

TOTAL: 45 PERIODS

REFERENCES

1. John R. Vacca, Computer and Information Security Handbook, Third Edition, Elsevier 2017
2. Michael E. Whitman, Herbert J. Mattord, Principles of Information Security, Seventh Edition, Cengage Learning, 2022
3. Richard E. Smith, Elementary Information Security, Third Edition, Jones and Bartlett Learning, 2019
4. Mayor, K.K.Mookhey, Jacopo Cervini, Fairuzan Roslan, Kevin Beaver, Metasploit Toolkit for Penetration Testing, Exploit Development and Vulnerability Research, Syngress publications, Elsevier, 2007. ISBN : 978-1-59749-074-0
5. John Sammons, "The Basics of Digital Forensics- The Primer for Getting Started in Digital Forensics", Syngress, 2012
6. Cory Altheide and Harlan Carvey, "Digital Forensics with Open Source Tools",2011 Syngress, ISBN: 9781597495875.

7. Siani Pearson, George Yee "Privacy and Security for Cloud Computing" Computer Communications and Networks, Springer, 2013.

CB1808A MALWARE ANALYSIS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To introduce the fundamentals of malware, types and its effects
- To enable to identify and analyse various malware types by static analysis
- To enable to identify and analyse various malware types by dynamic analysis
- To deal with detection, analysis, understanding, controlling, and eradication of malware

UNIT I INTRODUCTIONAND BASIC ANALYSIS 9

Goals of Malware Analysis, AV Scanning, Hashing, Finding Strings, Packing and Obfuscation, PE file format, Static, Linked Libraries and Functions, Static Analysis tools, Virtual Machines and their usage in malware analysis, Sandboxing, Basic dynamic analysis, Malware execution, Process Monitoring, Viewing processes, Registry snapshots, Creating fake networks

UNIT II ADVANCED STATIC ANALYSIS 9

X86 Architecture- Main Memory, Instructions, Opcodes and Endianness, Operands, Registers, Simple Instructions, The Stack, Conditionals, Branching, Rep Instructions, Disassembly, Global and local variables, Arithmetic operations, Loops, Function Call Conventions, C Main Method and Offsets. Portable Executable File Format, The PE File Headers and Sections, IDA Pro, Function analysis, Graphing, The Structure of a Virtual Machine, Analyzing Windows programs, Anti-static analysis techniques, obfuscation, packing, metamorphism, polymorphism.

UNIT III ADVANCED DYNAMIC ANALYSIS 9

Live malware analysis, dead malware analysis, analyzing traces of malware, system calls, api calls, registries, network activities. Anti-dynamic analysis techniques, VM detection techniques, Evasion techniques, , Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark, Kernel vs. User-Mode Debugging, OllyDbg, Breakpoints, Tracing, Exception Handling, Patching

UNIT IV MALWARE FUNCTIONALITY 9

Downloaders and Launchers, Backdoors, Credential Stealers, Persistence Mechanisms, Handles, Mutexes, Privilege Escalation, Covert malware launching- Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection, YARA rule based detection

UNIT V 9

Android Malware Analysis: Android architecture, App development cycle, APKTool, APKInspector, Dex2Jar, JD-GUI, Static and Dynamic Analysis, Case studies,

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1:Understand the various concept of malware analysisand their technologies used. CO2:Possess the skills necessary to carry out independent analysis of modern malware samples using both static and dynamic analysis techniques

CO3: Understand the methods and techniques used by professional malwareanalysts CO4:To be able to safely analyze, debug, and disassemble any malicious software by malware analysis

CO5: Understand the concept of Android malware analysis their architecture, and App development

REFERENCES

1. Michael Sikorski and Andrew Honig, “Practical Malware Analysis” by No Starch Press, 2012,ISBN: 9781593272906
2. Bill Blunden, “The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System”, Second Edition,Jones & Bartlett Publishers, 2009.
3. Jamie Butler and Greg Hoglund, “Rootkits: Subverting the Windows Kernel” by 2005, Addison-Wesley Professional, ISBN:978-0-321-29431-9
4. Bruce Dang, Alexandre Gazet, Elias Bachaalany, SébastienJosse, "Practical Reverse Engineering: x86, x64, ARM, Windows Kernel, Reversing Tools, and Obfuscation", 2014, ISBN: 978-1-118-78731-1
5. Victor Marak, "Windows Malware Analysis Essentials" Packt Publishing, O’Reilly, 2015, ISBN: 9781785281518
6. Ken Dunham, Shane Hartman, Manu Quintans, Jose Andre Morales, Tim Strazzere, "Android Malware and Analysis",CRC Press, Taylor & Francis Group, 2015, ISBN: 9781482252194
7. Windows Malware Analysis Essentials by Victor Marak, Packt Publishing, 2015

CO-PO Mapping

CO	**POs**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
1	3	3	-	2	-	1
2	2	1	-	-	1	-
3	2	3	2	-	2	3
4	3	1	-	-	2	2
5	3		-	2	1	-
Avg	2.6	2	2	2	1.5	2

CB1809A **DIGITAL AND MOBILE FORENSICS** **L T P C**

3 0 0 3

COURSE OBJECTIVES:

- To understand basic digital forensics and techniques.
- To understand digital crime and investigation.
- To understand how to be prepared for digital forensic readiness.
- To understand and use forensics tools for iOS devices.
- To understand and use forensics tools for Android devices.

UNIT I INTRODUCTION TO DIGITAL FORENSICS 6

Forensic Science – Digital Forensics – Digital Evidence – The Digital Forensics Process – Introduction – The Identification Phase – The Collection Phase – The Examination Phase – The Analysis Phase – The Presentation Phase - Chain of Custody in Digital Evidence Handling - Legal Considerations and Admissibility of Digital Evidence.

UNIT II DIGITAL CRIME AND INVESTIGATION 6

Digital Crime – Substantive Criminal Law – General Conditions – Offenses – Investigation Methods for Collecting Digital Evidence – International Cooperation to Collect Digital Evidence, Types of Digital Crimes: Hacking, Identity Theft, and Malware, Evidence Acquisition and Preservation Techniques.

UNIT III DIGITAL FORENSIC READINESS 6

Introduction – Law Enforcement versus Enterprise Digital Forensic Readiness – Rationale for Digital Forensic Readiness – Frameworks, Standards and Methodologies – Enterprise Digital Forensic Readiness – Challenges in Digital Forensics, ISO/IEC 27037 Guidelines for Digital Evidence Collection - Incident Response and Its Role in Forensic Readiness.

UNIT IV iOS FORENSICS 6

Mobile Hardware and Operating Systems - iOS Fundamentals – Jailbreaking – File System – Hardware – iPhone Security – iOS Forensics – Procedures and Processes – Tools – Oxygen Forensics – MobilEdit – iCloud, iOS Logical vs. Physical Acquisition Techniques- Bypassing iOS Security Measures: Encryption and Passcode Locks.

UNIT V ANDROID FORENSICS 6

Android basics – Key Codes – ADB – Rooting Android – Boot Process – File Systems – Security – Tools – Android Forensics – Forensic Procedures – ADB – Android Only Tools – Dual Use Tools – Oxygen Forensics – MobilEdit – Android App Decompiling - Understanding Android Security Architecture and Sandbox - Reverse Engineering and APK Analysis in Android Forensics.

COURSE OUTCOMES:

On completion of the course, the students will be able to:

CO1: Have knowledge on digital forensics.

CO2: Know about digital crime and investigations.

CO3: Be forensic ready.

CO4: Investigate, identify and extract digital evidence from iOS devices.

CO5: Investigate, identify and extract digital evidence from Android devices.

45 PERIODS

TEXT BOOK:

1. Andre Arnes, “Digital Forensics”, Wiley, 2018.
2. Chuck Easttom, “An In-depth Guide to Mobile Device Forensics”, First Edition, CRC Press, 2022.

REFERENCES

1. Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.

CO’s-PO’s & PSO’s MAPPING

CO’s	PO’s												PSO’s	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	1	3	2	1	-	-	-	1	1	3	3	1	3
2	3	3	3	3	3	-	-	-	2	2	1	2	1	3
3	3	3	2	3	1	-	-	-	3	2	1	1	3	2
4	3	1	2	2	3	-	-	-	1	3	3	2	1	3
5	1	3	2	3	2	-	-	-	2	3	2	3	1	2
AVg.	3	2	2	3	2	-	-	-	2	2	2	2	1	3

1 - low, 2 - medium, 3 - high, ‘-' - no correlation

CB1810A DEVOPS L T P C

3 0 3 3

COURSE OBJECTIVES:

- To introduce DevOps terminology, definition & concepts
- To understand the different Version control tools like Git, Mercurial
- To understand the concepts of Continuous Integration/ Continuous Testing/ Continuous Deployment)
- To understand Configuration management using Ansible
- Illustrate the benefits and drive the adoption of cloud-based Devops tools to solve real world problems

UNIT I INTRODUCTION TO DEVOPS 9

Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github - Understanding Git Internals: Commits, Branching, and Merging - Linux Shell Basics for DevOps Beginners.

UNIT II COMPILE AND BUILD USING MAVEN & GRADLE 9

Introduction, Installation of Maven, POM files, Maven Build lifecycle, Build phases(compile build, test, package) Maven Profiles, Maven repositories(local, central, global),Maven plugins, Maven create and build Artificats, Dependency management, Installation of Gradle, Understand build using Gradle - Navigating the Linux File System and Managing Files via CLI - Using Git to Manage Code for Build Automation.

UNIT III CONTINUOUS INTEGRATION USING JENKINS 9

Install & Configure Jenkins, Jenkins Architecture Overview, Creating a Jenkins Job, Configuring a Jenkins job, Introduction to Plugins, Adding Plugins to Jenkins, Commonly used plugins (Git Plugin, Parameter Plugin, HTML Publisher, Copy Artifact and Extended choice parameters). Configuring Jenkins to work with java, Git and Maven, Creating a Jenkins Build and Jenkins workspace - Running Jenkins Shell Commands and Build Scripts in Linux - Creating GitHub Webhooks for Jenkins Integration.

UNIT IV CONFIGURATION MANAGEMENT USING ANSIBLE 9

Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible - Using Linux Commands to Manage Configuration Files - Managing Version Control of Ansible Playbooks with GitHub.

UNIT V BUILDING DEVOPS PIPELINES USING AZURE 9

Create Github Account, Create Repository, Create Azure Organization, Create a new pipeline, Build a sample code, Modify azure-pipelines.yaml file - GitHub Branching Strategies and Pull Requests - Linux Environment Variables and Scripting in Azure Pipelines.

COURSE OUTCOMES:

CO1: Understand different actions performed through Version control tools like Git.
CO2: Perform Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins by building and automating test cases using Maven & Gradle.
CO3: Ability to Perform Automated Continuous Deployment
CO4: Ability to do configuration management using Ansible
CO5: Understand to leverage Cloud-based DevOps tools using Azure DevOps

45 PERIODS

TEXT BOOKS

1. Roberto Vormittag, "A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises", Second Edition, Kindle Edition, 2016.
2. Jason Cannon, "Linux for Beginners: An Introduction to the Linux Operating System and Command Line", Kindle Edition, 2014

REFERENCES

1. Hands-On Azure Devops: Cicd Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for ... DevOps and Microsoft Azure (English Edition) Paperback – 1 January 2020
2. by Mitesh Soni
3. Jeff Geerling, "Ansible for DevOps: Server and configuration management for humans", First Edition, 2015.
4. David Johnson, "Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps", Second Edition, 2016.
5. Mariot Tsitoara, "Ansible 6. Beginning Git and GitHub: A Comprehensive Guide to Version Control, Project Management, and Teamwork for the New Developer", Second Edition, 2019.
6. https://www.jenkins.io/user-handbook.pdf
7. https://maven.apache.org/guides/getting-started/

CO's- PO's & PSO's MAPPING

CO's	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	3	2	3	-	-	-	-	-	-	-	2	2
2	3	3	3	2	3	-	-	-	-	-	-	-	2	2
3	3	3	3	2	3	-	-	-	-	-	-	-	2	2
4	3	3	3	2	3	-	-	-	-	-	-	-	2	2
5	3	3	3	2	3	-	-	-	-	-	-	-	2	2

AVg.	3	3	3	2	3	-	-	-	-	-	-	-	2	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CB1811A APP DEVELOPMENT L T P C

3 0 0 3

COURSE OBJECTIVES:

- To learn development of native applications with basic GUI Components
- To develop cross-platform applications with event handling
- To develop applications with location and data storage capabilities
- To develop web applications with database access

UNIT I FUNDAMENTALS OF MOBILE & WEB APPLICATION DEVELOPMENT 9

Basics of Web and Mobile application development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web design - Understanding Android Activity Lifecycle - Differences Between WebView and Native Views.

UNIT II NATIVE APP DEVELOPMENT USING JAVA 9

Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Development Frameworks, Java & Kotlin for Android, Swift & Objective-C for iOS, Basics of React Native, Native Components, JSX, State, Props, Creating Your First Android App with Java: Activities, Layouts, and Intents, Handling State and Props in React Native Components.

UNIT III HYBRID APP DEVELOPMENT 9

Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks, Ionic, Apache Cordova, Using Apache Cordova Plugins for Device Access (Camera, GPS, etc.), Deploying Hybrid Apps to Devices and Emulators.

UNIT IV CROSS-PLATFORM APP DEVELOPMENT USING REACT-NATIVE 9

What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App, Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Cross- platform App Development Frameworks, Flutter, Xamarin, React-Native, Basics of React Native, Native Components, JSX, State, Props, Creating Navigation with React Navigation Library, Using Flexbox for Responsive Layouts in React Native.

UNIT V NON-FUNCTIONAL CHARACTERISTICS OF APP FRAMEWORKS 9

Comparison of different Ap p frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability, Debugging Techniques for Android Apps Using Logcat and Android Studio, Performance Comparison: Cordova vs. Native vs. React Native.

45 PERIODS

COURSE OUTCOMES:

CO1:Develop Native applications with GUI Components.

CO2: Develop hybrid applications with basic event handling.
CO3 Implement cross-platform applications with location and data storage capabilities.
CO4: Implement cross platform applications with basic GUI and event handling.
CO5:Develop web applications with cloud database access.

TEXT BOOKS

1. Head First Android Development, Dawn Griffiths, O'Reilly, 1st edition
2. Apache Cordova in Action, Raymond K. Camden, Manning. 2015
3. Full Stack React Native: Create beautiful mobile apps with JavaScript and React Native, Anthony Accomazzo, Houssein Djirdeh, Sophia Shoemaker, Devin Abbott, FullStack publishing

REFERENCES

1. Android Programming for Beginners, John Horton, Packt Publishing, 2nd Edition
2. Native Mobile Development by Shaun Lewis, Mike Dunn
3. Building Cross-Platform Mobile and Web Apps for Engineers and Scientists: An Active Learning Approach, Pawan Lingras, Matt Triff, Rucha Lingras
4. Apache Cordova 4 Programming, John M Wargo, 2015
5. React Native Cookbook, Daniel Ward, Packt Publishing, 2nd Edition

CO's- PO's & PSO's MAPPING

CO's	PO's												PSO's	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	2	2	3	2	3	2	1	1	2	-	-	2	3	1
2	1	2	3	2	3	1	-	-	1	-	-	1	2	1
3	1	1	2	1	2	2	-	1	1	-	-	2	3	2
4	2	1	3	1	1	1	-	2	2	-	-	2	1	2
5	2	2	3	1	2	2	1	-	2	-	-	2	3	1
AVg.	1.6	1.6	2.8	1.4	2.2	1.6	1	1.33333	1.6	-	-	1.8	2.4	1.4

1 - low, 2 - medium, 3 - high, '-' - no correlation

OPEN ELECTIVE I

CB1505A PRINCIPLES OF CYBER SECURITY

L	T	P	C
3	0	3	3

COURSE OBJECTIVES:

To know the cyber security principles, as well as the issues, policy and standards

To understand the difference between threat, risk, attack and vulnerability and how threats materialize into attacks .

To be familiar with the typical threats, attacks and exploits and the motivations behind them.

To study the defensive techniques against these attacks

To describe remedies for various existing cyber security breaches and to show the methodologies required to make future systems less prone to security failures

UNIT I INTRODUCTION TO CYBER SECURITY 9

Basic Cyber Security Concepts, layers of security, Vulnerability, Threat, Harmful acts, Internet Governance - Controls - Authentication -Access Control and Cryptography – Challenges and Constraints, Computer Criminals, CIA Triad, Motive of Attackers, Active Attacks, Passive Attacks, Software Attacks, Hardware Attacks, Spectrum of Attacks, Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks, Taxonomy of various attacks, IP spoofing, Methods of defence, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, Malicious code , Countermeasures.

UNIT II SECURITY IN OPERATING SYSTEMS & NETWORKS 9

Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network Security Attack- Threats to Network Communications - Wireless Network Security - Denial of Service

- Distributed Denial-of-Service.

UNIT III DEFENCES: SECURITY COUNTERMEASURES 9

Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity

- Database Disclosure - Data Mining and Big Data. Cloud Security Tools & Techniques,

UNIT IV PRIVACY IN CYBERSPACE 9

Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining - Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field Is Headed.

UNIT V MANAGEMENT AND INCIDENTS 9

Comprehensive Cyber Security Policy Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare- Cyberspace and the Law - International Laws - Cyber-crime - Cyber Warfare and HomeLand Security.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the broad set of technical, social & political aspects of Cyber Security

CO2: Describe the operational and organizational Cyber Security Aspects

CO3: Identify and assess different types of Cyber security breaches and possible solutions for a robust system

CO4: understand cyber-attacks, and also how to protect the entire Internet community from such attacks

CO5: Demonstrate the ability to select and design among available security solutions based on different domains of cyber systems

REFERENCES:

1. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , 2018
2. Nina Godbole, Sunit Belapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt. Ltd. , 2011
3. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithms, Applications, and Perspectives, CRC Press, 2018.
4. George K.Kostopoulos, Cyber Space and Cyber Security, CRC Press, 2013.
5. Martti Lehto, Pekka Neittaanmäki, Cyber Security: Analytics, Technology and Automation, Springer International Publishing Switzerland 2015
6. Chwan-Hwa (John) Wu, J. David Irwin, Introduction to Computer Networks and Cyber security, CRC Press T&F Group, 2013.
7. James Graham, Richard Howard and Ryan Otson, Cyber Security Essentials, CRC Press T&F Group, 2011

CO-PO Mapping

CO's	PO's												PSO's	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	2	3	3	3	-	2	-	-	-	-	-	-	-	-
2	2	1	3	2	-	2	-	-	-	-	-	-	-	-
3	1	-	1		-	3	-	-	-	-	-	-	-	-
4	2	2	2	2	-		-	-	-	-	-	-	-	-
5	3	2	2	3	2	2	3	-	-	-	-	-	-	-
Avg.	2	2	2.2	2.5	2	2.33 3333	-	-	-	-	-	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

CB1506A **DATA PRIVACY** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To understand the basics of data privacy
- To create architectural, algorithmic and technological foundations for the maintenance of the privacy
- To become knowledgeable in Static Data Anonymization Methods.
- To analyse anonymization algorithms
- To understand the concept of privacy preservation

UNIT I INTRODUCTION **9**

Data Privacy and its importance, Need for Sharing Data, Methods of Protecting Data, Importance of Balancing Data Privacy and Utility, Disclosure, Tabular Data, Micro data, Approaches to Statistical disclosure control, Ethics, principles, guidelines and regulations, Microdata concepts, Disclosure, Disclosure risk, Estimating re-identification risk, Non-perturbative microdata masking, Perturbative microdata masking, Information loss in microdata

UNIT II STATIC DATA ANONYMIZATION ON MULTIDIMENSIONAL DATA **9**

Static Data Anonymization on Multidimensional Data, Classification of Privacy Preserving Methods, Classification of Data in a Multidimensional Data Set, Group-Based Anonymization, k-Anonymity, l- Diversity, t-closeness

UNIT III STATIC DATA ANONYMIZATION ON COMPLEX DATA STRUCTURES **9**

Static Data Anonymization on Complex Data Structures, Privacy Preserving Graph Data, Privacy Preserving Time Series Data, Time Series Data Protection Methods, Privacy Preservation of Longitudinal Data, Privacy Preservation of Transaction Data

UNIT IV STATIC DATA ANONYMIZATION ON THREATS TO ANONYMIZED DATA **9**

Static Data Anonymization on Threats to Anonymized Data, Threats to Data Structures, Threats by Anonymization Techniques, Randomization, k-Anonymization, l-Diversity, t-Closeness. Dynamic Data Protection: Tokenization, Understanding Tokenization, Use Cases for Dynamic Data Protection, Benefits of Tokenization Compared to Other Methods, Components for Tokenization

UNIT V PRIVACY PRESERVING **9**

Privacy Preserving, Data Mining: Key Functional Areas of Multidimensional Data, Association Rule Mining, Clustering - Privacy Preserving Test Data Manufacturing Generation, Test Data Fundamentals, Utility of Test Data: Test Coverage, Privacy Preservation of Test Data, Quality of Test Data, Anonymization Design for PPTDG, Insufficiencies of Anonymized Test.

COURSE OUTCOMES:

CO1: Become familiar with the basics of privacy.
CO2: Understand how privacy is formalized.
CO3: Understand the common data privacy techniques.
CO4: Able to analyse Static Data Anonymization
CO5: Understand and analyse privacy preservation techniques

TOTAL: 45 PERIODS

REFERENCES

1. N. Venkataramanan and A. Shriram, "Data privacy: Principles and practice". CRC Press, 2016. ISBN: 978-1-49-872104-2

2. A. Hundepool, J. Domingo-Ferrer, L. Franconi, S. Giessing, and E. S. Nordholt, P.D. Wolf, “Statistical disclosure control”, Wiley, John & Sons, 2012. ISBN No.: 978-1-11-997815-2

3. G. T. Duncan, M. Elliot, J.-J. Salazar-González, J.-J. Salazar-Gonzalez, and J. J. Salazar, "Statistical confidentiality: Principles and practice", Springer-Verlag New York, 2011. ISBN: 978-1-44-197801-1

4. C. C. Aggarwal and P. S. Yu, "Privacy-preserving data mining: Models and Algorithms", Springer-Verlag New York, 2008. (ISBN No.: 978-0-387-70992-5)

CO-PO Mapping

CO	**POs**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
1	2	3	-	2	-	1
2	2	1	-	-	3	2
3	2	1	2	-	3	-
4	2	3	-	3	-	1
5	2	1	-	-	1	3
Avg	2	1.8	2	2.5	2.333333	1.75

1 - low, 2 - medium, 3 - high, ‘-' - no correlation

CB1507A DATA ANALYTICS FOR FRAUD DETECTION L T P C
3 0 0 3

COURSE OBJECTIVES:

- Discuss the overall process of how data analytics is applied
- Discuss how data analytics can be used to better address and identify risks
- Help mitigate risks from fraud and waste for our clients and organizations

UNIT I INTRODUCTION 9

Introduction: Defining Fraud, Anomalies versus, Fraud, Types of Fraud, Assess the Risk of Fraud, Fraud Detection, Recognizing Fraud, Data Mining versus Data Analysis and Analytics, Data Analytical Software, Anomalies versus Fraud within Data, Fraudulent Data Inclusions and Deletions

UNIT II DATA ANALYSIS CYCLE 9

The Data Analysis Cycle, Evaluation and Analysis, Obtaining Data Files, Performing the Audit, File Format Types, Preparation for Data Analysis, Arranging and Organizing Data, Statistics and Sampling, Descriptive Statistics, Inferential Statistics

UNIT III DATA ANALYTICAL TESTS 9

Benford's Law, Number Duplication Test, Z-Score, Relative Size Factor Test, Same-Same-Same Test, Same-Same-Different Test

UNIT IV ADVANCED DATA ANALYTICAL TESTS 9

Correlation, Trend Analysis, , GEL-1 and GEL-2 , Skimming and Cash Larceny, Billing schemes and Data Familiarization, Benford's Law Tests, Relative Size Factor Test, Match Employee Address to Supplier data

UNIT V ELECTRONIC PAYMENTS FRAUD PREVENTION 9

Payroll Fraud, Expense Reimbursement Schemes, Register disbursement schemes

COURSE OUTCOMES:

CO1:Formulate reasons for using data analysis to detect fraud.

CO2: Explain characteristics and components of the data and assess its completeness.

CO3:Identify known fraud symptoms and use digital analysis to identify unknown fraud symptoms.

CO4:Automate the detection process.

CO5:Verify results and understand how to prosecute fraud

TOTAL: 45 PERIODS

REFERENCES

1. Sunder Gee, "Fraud and Fraud Detection: A Data Analytics Approach", Wiley, 2014, ISBN: 978-1-118-77965-1
2. Bart Baesens, Veronique Van Vlasselaer, WouterVerbeke, "Fraud Analytics Using Descriptive, Predictive, and Social Network Techniques: A Guide to Data Science for Fraud Detection", Wiley and SAS Business Series, 2015
3. Han, Kamber, "Data Mining Concepts and Techniques", 3rd Ed., Morgan Kaufmann Publishers, 2012
4. Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2nd Ed., 2014.

CO-PO Mapping

CO	POs					
	PO1	PO2	PO3	PO4	PO5	PO6
1	2	1	-	-	3	
2	2	1	-	-	-	-
3	3	1	-	3	1	2
4	3	2	1	-	2	3
5	3	2	1	-	2	2
Avg	2.6	1.4	1	3	2	2.333333

1 - low, 2 - medium, 3 - high, '-' - no correlation

CB1508A **CLOUD SECURITY** **L T P C**
3 0 0 3

COURSE OBJECTIVES:

- To Introduce Cloud Computing terminology, definition & concepts
- To understand the security design and architectural considerations for Cloud
- To understand the Identity, Access control in Cloud
- To follow best practices for Cloud security using various design patterns
- To be able to monitor and audit cloud applications for security

UNIT I FUNDAMENTALS OF CLOUD COMPUTING 9

Understand what is Cloud computing, Architectural and Technological Influences of Cloud Computing, Understand the Cloud deployment models, Public, Private, Community and Hybrid models, Scope of Control, Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Cloud Computing Roles, Risks and Security Concerns.

UNIT II SECURITY DESIGN AND ARCHITECTURE FOR CLOUD 9

Guiding Security design principles for Cloud Computing, Comprehensive data protection, End-to-end access control, CSA, NIST and ENISA guidelines for Cloud Security, Common attack vectors and threats, Compute, Network and Storage, Secure Isolation Strategies, Multitenancy, Virtualization strategies, Inter-tenant network segmentation strategies, Storage isolation strategies, Data Protection strategies, Data retention, deletion and archiving procedures for tenant data, Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key

UNIT III ACCESS CONTROL AND IDENTITY MANAGEMENT 10

Understand the access control requirements for Cloud infrastructure, Enforcing Access Control Strategies, Authentication and Authorization, Roles-based Access Control, Multi-factor authentication, Host, storage and network access control options, OS Hardening and minimization, securing remote access, Verified and measured boot, Firewalls, Intruder Detection, Intruder prevention and honeypots, User Identification, Authentication, and Authorization in Cloud Infrastructure, Identity & Access Management, Single Sign-on, Identity Federation, Identity providers and service consumers, The role of Identity provisioning

UNIT IV CLOUD SECURITY DESIGN PATTERNS 9

Introduction to Design Patterns, Platform-to-Virtualization & Virtualization-to-Cloud, Cloud bursting, Geo-tagging, Cloud VM Platform Encryption, Secure Cloud Interfaces, Cloud Resource Access Control, Secure On-Premise Internet Access, Secure External Cloud Connection, Cloud Denial-of-Service Protection, Cloud Traffic Hijacking Protection, Cloud Authentication Gateway, Federated Cloud Authentication, Cloud Key Management

UNIT V MONITORING, AUDITING AND MANAGEMENT 8

Proactive activity monitoring, Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges, intrusion detection, events and alerts, Auditing – Record generation, Reporting and Management, Tamper-proofing audit logs, Quality of Services, Secure Management, User management, Identity management, Security Information and Event Management

COURSE OUTCOMES:

CO1: Understand the cloud concepts and fundamentals. CO2:
Explain the security challenges in cloud.
CO3: Define cloud policy and Identity and Access Managements.
CO4: Understand various risks, and audit and monitoring mechanisms in cloud. CO5:
Define the various architectural and design considerations for security in cloud.

TOTAL PERIODS:45

REFERENCES

1. Raj Kumar Buyya , James Broberg, andrzej Goscinski, ―Cloud Computing:‖, Wiley 2013
2. Dave shackleford, ―Virtualization Security‖, SYBEX a wiley Brand 2013.
3. Mather, Kumaraswamy and Latif, ―Cloud Security and Privacy‖, OREILLY 2011
4. Mark C. Chu-Carroll ―Code in the Cloud‖,CRC Press, 2011
5. Mastering Cloud Computing Foundations and Applications Programming Rajkumar Buyya, Christian Vechhiola, S. Thamarai Selvi

CO-PO Mapping

CO	**POs**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
1	2		-	-	-	3
2	2	1	2	-	1	-
3	2	2	-	-	-	1
4	2	1	-	2	3	-
5	2	2	-	-	-	1
Avg	2	1.5	2	2	2	1.666667

1 - low, 2 - medium, 3 - high, '-' - no correlation

OPEN ELECTIVE II

CB1704A	WEB SECURITY	L T P C
		3 0 0 3

COURSE OBJECTIVES:

- To provide the importance of Web Security
- To discuss the fundamentals of web application authentication and session management
- To study and practice fundamental techniques in developing secure web based applications
- To identify and find the vulnerabilities of web based applications and to protect those applications from attacks
- To examine the exploiting and preventing of path traversal vulnerability

UNIT I WEB APPLICATION TECHNOLOGIES 9

Introduction – Evolution of web applications – Web application security – Core defense mechanisms – Handling user access – Handling user input – Handling attackers – Managing the application - The OWASP top ten list Web Application Technologies : Web functionality – Encoding schemes – Mapping the Application - Enumerating the content and functionality – Analysing the application – Bypassing client side controls : Transmitting data via the client – Capturing user data – Handling client side data securely - Input Validation, Blacklist Validation - Whitelist Validation - The Defence-in-Depth Approach - Attack Surface Reduction Rules of Thumb.

UNIT II WEB APPLICATION AUTHENTICATION AND SESSION MANAGEMENT 9

Web Application Authentication : Authentication Fundamentals- Two factor and Three Factor authentication - Password Based, Built in HTTP, single sign-on Custom Authentication- Secured Password based authentication: Attacks against password, Importance of password complexity – Design flaws in authentication mechanisms – Implementation flaws in authentication mechanisms – Securing authentication Session Management: Need – Weaknesses in Session Token Generation – Weaknesses in Session Token Handling – Securing Session Management; Access Control : Access Control overview, Common vulnerabilities – attacking access controls – Securing Access Controls

UNIT III WEB SECURITY PRINCIPLES: 9

Web Security Principles: Origin Policy, Exceptions Cross Site Scripting, Cross site Forgery Scripting; File Security Principles: Source code Security, Forceful Browsing, Directory Traversals-Classifying and Prioritizing Threats Origin Policy

UNIT IV WEB APPLICATION VULNERABILITY 9

Web Application Vulnerability: Understanding vulnerabilities in traditional client server application and web applications, client state manipulation, Cookie based attacks, SQL injection, cross domain attack (XSS/XSRF/XSSI) http header injection. SSL vulnerabilities and testing - Proper encryption use in web application - Session vulnerabilities and testing - Cross-site request forgery

UNIT V EXPLOITING SYSTEMS 9

Exploiting Systems: Path traversal - Finding and exploiting path traversal vulnerability – Preventing path traversal vulnerability – Information disclosure - Exploiting error messages – Securing compiled applications – Buffer overflow vulnerability – Integer vulnerability – Format string vulnerability

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1: To understand common vulnerabilities plaguing today's web applications CO2: To understand security-related issues in web based systems and applications. CO3: To understand the fundamental security mechanisms of a Web-based system.
CO4: To be able to develop and deploy customized exploits that can bypass common defenses
CO5: To be able to evaluate a web based system with respect to its security requirements.

REFERENCES

1. B. Sullivan, V. Liu, and M. Howard, Web Application Security, A Beginner's Guide. New York: McGraw-Hill Education, 2011.
2. D. Stuttard and M. Pinto, The Web Application Hacker's Handbook: Discovering and Exploiting Security Flaws, 2nd ed. Indianapolis, IN: Wiley, John & Sons, 2011.
3. W. Hanqing and L. Zhao, Web Security: A Whitehat Perspective. United Kingdom: Auerbach Publishers, 2015.
4. M. Shema and J. B. Alcover, Hacking Web Apps: Detecting and Preventing Web Application Security Problems. Washington, DC, United States: Syngress Publishing, 2014.

CO-PO Mapping

CO	**POs**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
1	2	1	-	-	-	1
2	2	1	-	-	-	1
3	2	1	-	-	1	-
4	3	2	1	-	-	1
5	3	2	1	-	2	1
Avg	2.4	1.4	1	-	1.5	1

1 - low, 2 - medium, 3 - high, '-' - no correlation

CB1706A BLOCKCHAIN TECHNOLOGIES L T P C
3 0 0 3

COURSE OBJECTIVES:

- This course is intended to study the basics of Blockchain technology.
- During this course the learner will explore various aspects of Blockchain technology like application in various domains.

- By implementing, learners will have idea about private and public Blockchain, and smart contract.

UNIT I INTRODUCTION OF CRYPTOGRAPHY AND BLOCKCHAIN 9

Introduction to Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions and Blocks, P2P Systems, Keys as Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain.

UNIT II BITCOIN AND CRYPTOCURRENCY 9

Introduction to Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain and Digital Currency, Transactional Blocks, Impact of Blockchain Technology on Cryptocurrency.

UNIT III INTRODUCTION TO ETHEREUM 9

Introduction to Ethereum, Consensus Mechanisms, Metamask Setup, Ethereum Accounts, , Transactions, Receiving Ethers, Smart Contracts.

UNIT-IV INTRODUCTION TO HYPERLEDGER AND SOLIDITY PROGRAMMING 10

Introduction to Hyperledger, Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer. Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types.

UNIT V BLOCKCHAIN APPLICATIONS 8

Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After the completion of this course, student will be able to

CO1: Understand and explore the working of Blockchain technology

CO2: Analyze the working of Smart Contracts

CO3: Understand and analyze the working of Hyperledger

CO4: Apply the learning of solidity to build de-centralized apps on Ethereum

CO5: Develop applications on Blockchain

REFERENCES:

1. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained”, Second Edition, Packt Publishing, 2018.
2. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction” Princeton University Press, 2016
3. Antonopoulos, Mastering Bitcoin, O’Reilly Publishing, 2014. .
4. Antonopoulos and G. Wood, “Mastering Ethereum: Building Smart Contracts and

Dapps", O'Reilly Publishing, 2018.
5. D. Drescher, Blockchain Basics. Apress, 2017.

CO-PO Mapping

CO	POs					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
1	3	2	-	2	-	2
2	2	2		-	2	1
3	3	1	-	3	1	-
4	3	2	2	-	2	3
5	3	2		-	1	3
Avg	2.8	1.8	2	2.5	1.5	2.25

1 - low, 2 - medium, 3 - high, '-' - no correlation

CB1707A SECURITY PRACTICES L T P C
3 0 0 3

COURSE OBJECTIVES:

To learn the core fundamentals of system and web security concepts
To have through understanding in the security concepts related to networks
To deploy the security essentials in IT Sector
To be exposed to the concepts of Cyber Security and cloud security
To perform a detailed study of Privacy and Storage security and related Issues

UNIT I SYSTEM SECURITY 9

Model of network security – Security attacks, services and mechanisms – OSI security architecture - A Cryptography primer- Intrusion detection system- Intrusion Prevention system - Security web applications- Case study: OWASP - Top 10 Web Application Security Risks.

UNIT II NETWORK SECURITY 9

Internet Security - Intranet security- Local Area Network Security - Wireless Network Security - Wireless Sensor Network Security- Cellular Network Security - Mobile security - IOT security - Case Study - Kali liunx.

UNIT III SECURITY MANAGEMENT 9

Information security essentials for IT Managers- Security Management System - Policy Driven System Management- IT Security - Online Identity and User Management System. Case study: Metasploit

UNIT IV CYBER SECURITY AND CLOUD SECURITY 9

Cyber Forensics- Disk Forensics – Network Forensics – Wireless Forensics – Database Forensics – Malware Forensics – Mobile Forensics – Email Forensics- Best security practices for automate Cloud infrastructure management – Establishing trust in IaaS, PaaS, and SaaS Cloud types. Case study: DVWA

UNIT V PRIVACY AND STORAGE SECURITY **9**

Privacy on the Internet - Privacy Enhancing Technologies - Personal privacy Policies - Detection of Conflicts in security policies- privacy and security in environment monitoring systems. Storage Area Network Security - Storage Area Network Security Devices - Risk management - Physical Security Essentials.

COURSE OUTCOMES:

CO1: Understand the core fundamentals of system security

CO2: Apply the security concepts to wired and wireless networks

CO3: Implement and Manage the security essentials in IT Sector

CO4: Explain the concepts of Cyber Security and Cyber forensics

CO5: Be aware of Privacy and Storage security Issues.

TOTAL: 45 PERIODS

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CO-PO Mapping

CO	**POs**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
1	2					3
2	3	2	3		2	1
3	3	2	3		2	1
4	2			3		2
5	2				3	
Avg	2.4	2	3	3	2.333333	1.75

1 - low, 2 - medium, 3 - high, ‘-' - no correlatio