DEPARTMENT OF
SOFTWARE ENGINEERING
Periyar Nagar, Vallam, Thanjavur-613403, Tamilnadu
Phone +91-4362 264600,Fax +91-4362 264650
Email:headmsc@pmu.edu, Web www.pmu.edu

PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University)
Established Under Sec. 3 of UGC Act, 1956 • NAAC Accredited
think • innovate • transform

FACULTY OF COMPUTING SCIENCES AND ENGINEERING

CURRICULUM & SYLLABUS

FOR

B.Sc. Computer Science (Cyber Security)

(Based on Outcome Based Education)

Learning Outcomes based Curriculum Framework (LOCF)

(I - VI Semester)

REGULATIONS – 2023

CURRICULUM for
B. Sc Computer Science(Cyber Security)
REGULATIONS – 2023
(Applicable to the students admitted from the Academic year 2023 - 2024)

I SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
LAN	XGT101 /XFT101	Tamil – I / Foundation Tamil-I	2	1	0	0	**3**	2	1	0	0	3
AECC-1	XGE102	English – I	2	1	0	0	**3**	2	1	0	0	3
CC-1A	XCI103	Programming in C	4	1	0	0	**5**	4	1	0	0	5
CC-1B	XCI104	Algebra, Calculus & Analytical Geometry	4	1	0	0	**5**	4	1	0	0	5
CC-1C	XCI105	Basics of Computers and Cyber crime	3	0	0	0	**3**	3	0	0	0	3
CC-1A-Lab	XCI106	Programming in C Lab	0	0	1	0	**1**	0	0	3	0	3
CC-1C-Lab	XCI107	Office Automation Lab	0	0	1	0	**1**	0	0	3	0	3
UMAN-1	XUMA001	Human Ethics, Values, Rights, and Gender Equality	1	0	0	1	**1**	1	0	0	1	1+1
Extension Activites NSS,NCC,NSO,RRC and Swatch Bharath)												2
Mentor Hour												1
Library Hour												1
Total			**16**	**4**	**2**	**1**	**22**	**16**	**4**	**6**	**0**	**30**

II SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 3	XGT201/ XFT201	Tamil – II/ Foundational Tamil - II	2	1	0	0	**3**	2	1	0	0	3
AECC 4	XGE202	English – II	2	1	0	0	**3**	2	1	0	0	3
CC- 2A	XCI203	Data Structures	4	1	0	0	**5**	4	1	0	0	5
CC- 2B	XCI204	Discrete Mathematics	4	1	0	0	**5**	4	1	0	0	5
CC- 2C	XCI205	Python Programming	3	1	0	0	**4**	3	1	0	0	4
CC2A-P	XCI206	Data Structures Lab	0	0	1	0	**1**	0	0	3	0	3
CC2C-P	XCI207	Python Programming Lab	0	0	1	0	**1**	0	0	2	0	2
UMAN-2	XUMA002	Environmental Studies	1	0	0	0	**1**	1	0	0	0	1
Extension Activites NSS,NCC,NSO,RRC and Swatch Bharath)											2	2
Mentor Hour												1
Library Hour												1
		Total	**16**	**5**	**2**	**0**	**23**	**13**	**4**	**8**	**2**	**30**

III SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Tot	L	T	P	SS	Tot
AECC 5	XGT301/ XFT301	Tamil – III/ Foundational Tamil – III	2	1	0	0	**3**	2	1	0	0	3
AECC 6	XGE303	English – III	2	1	0	0	**3**	2	1	0	0	3
SEC-1B	XCI 303	Algorithms	2	0	0	0	**2**	2	0	0	1	**2**
CC-3A	XCI 304	Data Communication and Netwroking	3	1	0	0	**4**	3	1	0	0	**4**
CC-3B	XCI 305	Database Management Systems	3	0	0	0	**3**	3	0	0	0	**3**
CC-3C	XCI 306	Auxillary Physics	3	0	0	0	**3**	3	0	0	0	**3**
CC-3A-P	XCI 307	Communication Lab	0	0	1	0	**1**	0	0	2	0	**2**
CC-3B-P	XCI308	Database Management Systems Lab	0	0	1	0	**1**	0	0	2	0	**2**
CC-3C-P	XCI309	Allied Physics Lab	0	0	1	0	**1**	0	0	2	0	**2**
GE-1		*Open Elective - To be chosen by student	3	0	0	0	**3**	3	0	0	0	**3**
UMAN 3	**XUMA003**	Disaster Management	1	0	0	0	**1**	1	0	0	1	**1**
Minor Course	**XCI 310**	Micro Processor (* Extra Credit)	1	0	0	0	1*	**1**	0	0	0	1
Extension Activities NSS,NCC,NSO,RRC and Swatch Bharath)											1	0
Mentor Hour												1
Library Hour												0
Total			**18**	**1**	**3**	**0**	**25+ 1***	**18**	**1**	**7**	**1**	**30**

IV SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 7	XGT401/ XFT401	Tamil – IV/ Foundational Tamil – IV	2	1	0	0	**3**	2	1	0	0	3
AECC 8	XGE402	English – IV	2	1	0	0	**3**	2	1	0	0	3
SEC-2B	XCI 403	Operating System	3	0	0	0	**3**	3	0	0	0	**3**
CC - 4A	XCI 404	Internet of things	2	0	0	0	**2**	2	0	0	0	**2**
CC – 4B	XCI 405	Cryptography	3	1	0	0	**4**	3	1	0	0	**4**
CC – 4C	XCI 406	Cyber Law	3	0	0	0	**3**	3	0	0	0	**3**
CC -4A-P	XCI 407	Internet of things Lab	0	0	1	1	**2**	0	0	2	0	**2**
CC -4B-P	XCI408	Cryptography Lab	0	0	1	1	**2**	0	0	2	0	**2**
GE-2		*Open Elective - To be chosen by student	3	0	0	0	**3**	3	0	0	0	**3**
UMAN4	XUMA004	Introduction to Entrepreneurship Development	1	0	0	0	**1**	1	0	0	1	**2**
Minor Course	XCI409	Prolog (* Extra Credit)	1*	0	0	0	**1***	1	0	0	0	**1**
Extension Activities NSS,NCC,NSO,RRC and Swatch Bharath)											2	0
Mentor Hour												1
Library Hour												1
		Total	**16**	**2**	**2**	**0**	**25+ 1***	**17**	**2**	**6**	**3**	**30**

V SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
SEC-3A	XCI 501A	.NET Technologies	3	0	0	0	**3**	3	0	0	0	**3**
	XCI 501B	Programming in Java										
	XCI 501C	Open source software										
DSE-1A	XCI502A	Cyber Threat & Model	3	1	0	0	**4**	3	1	0	0	**4**
	XCI502B	Biometric Security										
	XCI502C	Block Chain & Crypto currency										
	XCI502D	Intrusion detection and Prevention System										
DSE-1B	XCI503A	Natural Language Processing	2	1	0	0	**3**	2	1	0	0	**3**
	XCI503B	Ethical Hacking										
	XCI503C	Sentiment Analytics										
DSE-1C	XCI504A	System Security	3	1	0	1	**5**	3	1	0	1	**5**
	XCI504B	Cloud Computing and its Security										
	XCI504C	Ethics of AI										
DSE-1A-P Lab	XCI505A	Natural Language Processing Lab	0	0	2	0	**2**	0	0	4	0	**4**
	XCI505B	Ethical Hacking Lab										
	XCI505C	Semantic Analytics Lab										
DSE -1B-P Lab	XCI 506A	.NET Technologies Lab	0	0	1	0	**1**	0	0	2	0	**2**
	XCI506B	Programming in Java Lab										
	XCI 506C	Open source software Lab										
GE-3		*Open Elective - To be chosen by student	3	0	0	0	**3**	3	0	0	0	**3**
UMAN5	XUMA005	Cyber Security	1	0	0	0	**1**	1	0	0	1	**2**
Extension Activities NSS,NCC,NSO,RRC and Swatch Bharath)											2	2
Mentor Hour												1
Library Hour												1
	XCI508	IPT 21 Days	0	0	0	0	**2**	0	0	0	0	**0**
		Total	**15**	**3**	**3**	**1**	**24**	**14**	**3**	**8**	**2**	**30**

V1 SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
SEC-4A	XCI601A	Web Technologies	2	1	0	0	**3**	2	1	0	0	**3**
	XCI601B	Mobile Application Development										
	XCI601C	Cyber Crime investigation and digital forensics										
DSE-2A	XCY602A	Human Computer Interface	3	1	0	0	**4**	3	1	0	0	**4**
	XCI602B	Web Mining & Recommender Systems										
	XCI602C	Penetration testing										
	XCI602D	Social Networks and Security										
DSE-2B	XCI603A	Data Analytics	2	1	0	0	**3**	2	1	0	0	**3**
	XCI603B	Malware Analysis										
	XCI603C	Cloud Computing										
DSE-2A-P Lab	XCI604A	Human Computer Interface Lab	0	0	1	0	**1**	0	0	2	0	**2**
	XCI604B	Web Mining & Recommender Systems Lab										
	XCI604C	Penetration Testing Lab										
	XCI604D	Social Networks and Security Lab										
SEC-4A-P Lab	XCI605A	Web Technologies Lab	0	0	1	0	**1**	0	0	2	0	**2**
	XCI605B	Mobile Application Development Lab										
	XCI605C	Cyber Crime investigation and digital forensics Lab										
DSE-2C	XCI606	Project Work	0	0	6	4	**10**	**0**	**0**	**12**	**0**	**12**
Extension Activities (NSS,NCC,NSO,RRC and Swachh Bharath)											**2**	**2**
Mentor Hour												**1**
Library Hour												**1**
Total			**7**	**3**	**10**	**0**	**22**	**7**	**3**	**16**	**2**	**30**

Semester	Credits	Hours
I Sem	**24**	**30**
II Sem	**23**	**30**
III Sem	**25+1***	**30**
IV Sem	**25+1***	**30**
V Sem	**24**	**30**
VI Sem	**22**	**30**
Total	**143+2***	

Course Code			L	T	P	C
Course Name	**தமிழ் - I**		3	0	0	3
Prerequisite			L	T	P	H
C:P:A	3:0:0		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	*Recognize* (அடையாளம் காணுதல்) பல்வேறு அறிஞர் பெருமக்களின் தொண்டுகளைத் தமிழ்மொழி மூலம் அறிந்து கொள்ளல்.	Cognitive	Remember
CO2	*Choose* (தெரிவு செய்தல்) பன்முகப் பரிமாணங்களின் கவிதைகளை இலக்கியங்கள் மூலம் அறிந்து கொள்ளல்.	Cognitive	Remember
CO3	*Describe* (விளக்குதல்) தமிழ் மகளிரின் உரையாடல் சிறப்புச் செய்திகளை உணர்தல்.	Cognitive	Understand
CO4	*Apply* (விளக்குதல்) பல்வேறு கலைத்துறைச் சார்ந்த பிரிவுகள், மண்ணின் பாடல்கள் குறித்துத் தெளிவு பெறல்.	Cognitive	Apply
CO5	*Analyze* (பகுத்தல்) சிறுகதைகளின் தோற்றம் மற்றும் வளர்ச்சி நிலை நாடகங்கள் - கவிதை குறித்துத் தெளிவு பெறுதல்.	Cognitive	Analyze

அலகு-1	**தமிழ் அறிஞர்களும் தமிழ்த்தொண்டும்**	9
பாரதியார், பாரதிதாசன், நாமக்கல் கவிஞர், சி.இலக்குவனார், உ.வே.சாமிநாத அய்யர், தெ.பொ.மீனாட்சி சுந்தரம், கவிமணி தேசியவிநாயகம் பிள்ளை தொடர்பான செய்திகள், சிறந்த தொடர்கள், சிறப்புப் பெயர்கள்.		
அலகு-2	**கவிதைகள் (மரபுக்கவிதை, புதுக்கவிதை)**	9
மரபுக்கவிதை : முடியரசன், வாணிதாசன், சுரதா, கண்ணதாசன், உடுமலை நாராயண கவி, பட்டுக்கோட்டை கல்யாண சுந்தரம், மருதகாசி தொடர்பான செய்திகள். புதுக்கவிதை : ந.பிச்சமூர்த்தி, சி.சு.செல்லப்பா, மு.மேத்தா, ஈரோடு தமிழன்பன், அப்துல் ரகுமான், ஞானக்கூத்தன், ஆலந்தூர் மோகனரங்கன் தொடர்பான செய்திகள்.		
அலகு-3	**உரையாடல்கள், தமிழ் மகளிரின் சிறப்பு**	9
ஜி.யு.போப் மற்றும் வீரமாமுனிவரின் தமிழ்ப்பணி, பெரியார், அண்ணா, முத்துராமலிங்கத்தேவர், அம்பேத்கர், காமராசர், மா.பொ.சிவஞானம், காயிதே மில்லத் சமுதாயத் தொண்டு. அன்னி பெசண்ட் அம்மையார், மூவாலூர் ராமாமிர்தம்மாள், டாக்டர் முத்துலட்சுமி ரெட்டி, வேலுநாச்சியார், வள்ளியம்மை, ராணி மங்கம்மாள் சிறப்பு.		
அலகு-4	**நாட்டுப்புறப்பாடல்**	9
தாலாட்டுப்பாடல், தொழில் பாடல், ஒப்பாரிப் பாடல்.		
அலகு-5	**இலக்கிய வரலாறு**	9
உரைநடை, சிறுகதை, நாடகம், கவிதைகள்.		

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	---	---	45

பாட நூல்கள்:

1. முனைவர் கா.செல்வகுமார் (தொ.ஆ.), பொதுத்தமிழ், மார்ச் - 2022, துரைகோ பதிப்பகம், அரும்பாக்கம், சென்னை – 106. 9884159972.
2. முனைவர் மு.அருணாசலம் (ப.ஆ.) – தமிழ் இலக்கிய வரலாறு – 2012, அருண் பதிப்பகம், தரைத்தளம், பாலாஜி நகர், ஞடீஜ காலனி, கண்டோன்மெண்ட், திருச்சி - 1. 9894440530
3. சு.சக்திவேல் - நாட்டுப்புற இயல் ஆய்வு, மணிவாசகர் பதிப்பகம் - 12, மேலசன்னதி வீதி, சிதம்பரம் - 1.
4. முனைவர் கோ.பெரியண்ணன் - அடிப்படை எளிய தமிழ் இலக்கணம் - 2003 –வனிதா பதிப்பகம், 11- நானா தெரு, பாண்டி பஜார், தி.நகர், சென்னை - 17.

Course Code		L	T	P	C
Course Name	அடிப்படைத் தமிழ்- I	3	0	0	3
Prerequisite		L	T	P	H
C:P:A	3:0:0	3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	உயிர் எழுத்துக்கள் - மெய்யெழுத்துகள் வகைப்படுத்தி நினைவூட்டல்.	Cognitive	Remember
CO2	உடல் உறுப்புப் பெயர்கள் - எளிய சொற்களை தொகுத்துக் கூறுதல்	Cognitive	Remember
CO3	ஒலி வேறுபாடுளைப் புரிந்து கொள்ளும் திறன் பெறல்	Cognitive	Understand
CO4	தமிழில் உரையாடல் - இயற்கையை வருணித்தல்.	Cognitive	Apply
CO5	அறநெறிக் கருத்துக்களை வகைப்படுத்தும் திறன் பெறல்.	Cognitive	Analyze

அலகு– 1	எழுத்துக்களின் வகைகள்	9
உயிர் எழுத்துக்கள் - மெய்யெழுத்துகள் - பிரித்து எழுதுதல் - சேர்த்து எழுதுதல் - பொருள் விளக்கம் அறிதல்		
அலகு– 2	எளிய தமிழ்ச் சொற்களை வகைப்படுத்துதல்	9
உடல் உறுப்புப் பெயர்கள் - எளிய தமிழ்ச் சொற்கள் வகைப்படுத்துதல்		
அலகு– 3	ஒலி வேறுபாட்டுத் திறன்	9
ஒலி வேறுபாடுகள் - சொல் வகைகள்		
அலகு– 4	உரையாடல்	9
தமிழில் உரையாடல் - இயற்கையைப் பற்றி அறிதல் - வருணனை செய்தல்		
அலகு– 5	அறநெறிக் கருத்துக்களைப் பின்பற்றுதல்	9
விழாக்கள் - அறநெறிக் கதைகள் - பிழையின்றிப் படித்தல், எழுதுதல்		

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	---	---	45

பாடநூல்கள்:

1. முனைவர் கோ.பெரியண்ணன் - அடிப்படை எளிய தமிழ் இலக்கணம் -2003, வனிதா பதிப்பகம், 11, நானா தெரு, பாண்டி பஜார், தி.நகர், சென்னை - 17.
2. முனைவர் ந.லெனின் - பிழையின்றித் தமிழை எழுதுக (எளியமுறை) சூன்-2020, பிருந்தா பதிப்பகம், தஞ்சாவூர் - 05.

பார்வை நூல்கள்:

1. தமிழ்நாடு அரசு வெளியிட்டுள்ள தமிழ்ப் பாட நூல்கள், வகுப்பு - 6, 7, 8.

COURSE CODE	XGE102	L	T	P	SS	H	C
COURSE NAME	English - I	3	0	0	0	3	3
C:P:A - 3:0:0							

COURSE OUTCOMES:		Domain	Level
CO1	***Recall*** the basic grammar and using it in proper context	Cognitive	Remembering
CO2	***Explain*** the process of listening and speaking	Cognitive	Understanding
CO3	***Adapt*** important methods of reading	Cognitive	Creating
CO4	***Demonstrate*** the basic writing skills	Cognitive	Understanding

SYLLABUS		HOURS
UNIT I	**Grammar**	
i. Major basic grammatical categories ii. Notion of correctness and attitude to error correction		9
UNIT II	**Listening and Speaking**	
iii. Importance of listening skills iv. Problems of listening to unfamiliar dialects v. Aspects of pronunciation and fluency in speaking vi. Intelligibility in speaking		9
UNIT III	**Basics of Reading**	
vii. Introduction to reading skills viii. Introducing different types of texts – narrative, descriptive, extrapolative		9
UNIT IV	**Basics of Writing**	
ix. Introduction to writing skills x. Aspects of cohesion and coherence xi. Expanding a given sentence without affecting the structure xii. Reorganizing jumbled sentences into a coherent paragraph xiii. Drafting different types of letters (personal notes, notices, complaints, appreciation, conveying sympathies etc.)		9
	Total Hours	**36**

Text books

1. Acevedo and Gower M (1999) Reading and Writing Skills. London, Longman
2. Deuter, M et.al. (2015). Oxford Advanced Learner's Dictionary of English (Ninth Edition). New Delhi, OUP
3. Eastwood, John (2008). Oxford Practice Grammar. Oxford, OUP
4. Hadefield, Chris and J Hadefield (2008). Reading Games. London, Longman
5. Hedge, T (2005). Writing. Oxford, OUP
6. Jolly, David (1984). Writing Tasks: Stuidents' Book. Cambridge, CUP
7. Klippel and Swan (1984). Keep Talking. Oxford, OUP
8. Saraswati, V (2005). Organized Writing 1. Hyderabad, Orient Blackswan
9. Swan, Michael. (1980). Practical English Usage. Oxford, OUP
10. Walter and Swan (1997). How English Works. Oxford, OUP

Table 1: Mapping of Cos with POs:

	PO1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO11	PO12	PSO1	PSO2
CO1	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO2	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO3	1	0	0	0	0	0	1	0	1	0	0	0	0	0
CO4	2	0	0	0	0	0	1	0	1	0	0	0	0	0
Total	7	0	0	0	0	0	6	0	4	0	0	0	0	0
Scaled Value	2	0	0	0	0	0	2	0	1	0	0	0	0	0
	1	0	0	0	0	0	1	0	1	0	0	0	0	0

1-5= 1, 6-10 = 2, 11-15= 3

0-No Relation, 1- Low Relation, 2 – Medium Relation, 3- High Relation

Table 2: Mapping of COs with GAs:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	0	0	0	0	0	0	0	1	1	2	0	0
CO2	0	0	0	0	0	0	0	0	0	2	0	0
CO3	0	0	0	0	0	0	0	0	0	1	0	0
CO4	0	0	0	0	0	0	0	0	0	0	1	0
Total	0	0	0	0	0	0	0	1	1	5	2	0
Scale	0	0	0	0	0	0	0	1	1	1	1	0

1-5= 1, 6-10 = 2, 11-15= 3

0-No Relation, 1- Low Relation, 2 – Medium Relation, 3- High Relation

Performance Indicators

PI 8: 1 High Ethical Standards

1.1.1 Practice ethical codes and standards endorsed by professional engineers.

PI 9: 1 Leadership and team work

1.1.1 Perform as an individual and as a leader in diverse teams and in multi-disciplinary scenarios.

PI 10: 1Communication Skills

1.1.1 Professional communication with the society to comprehend and formulate reports, documentation, effective delivery of presentation and responsible to clear instructions.

PI 1 1: 1. Life-long learners:

1.1.1 Update the technical needs in a challenging world in equipping themselves to maintain their competence

XCI103- Programming in C

Sub Code	Programming in C	L	T	SS	C
		4	1	0	5
XCI 103		L	T	SS	H
		4	1	0	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Recognize*** the importance of developing simple algorithms and flow charts to solve a problem.	Cognitive Psychomotor	Remember Perception
CO2	***Identify*** the needs problem solving skills coupled with top down design principles.	Cognitive Psychomotor	Understand Perception
CO3	***Demonstrate*** the strategies of array processing algorithms coupled with iterative methods.	Cognitive Psychomotor Affective	Apply Perception Receive
CO4	***Illustrate*** the concept of Structures application development.	Cognitive Psychomotor Affective	Apply Mechanism Respond
CO5	***Develop*** and ***Establish***searching techniques and use of pointers. recursive techniques in programming	Cognitive Psychomotor	Create Origination

UNIT I	INTRODUCTION TO PROGRAMMING	12+3

Introduction to Programming, Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies, Introduction to C++ Programming - Basic Program Structure In C++, Variables and Assignments, Input and Output, Selection and Repetition Statements.

UNIT II	FUNCTIONS	12+3

Top-Down Design, Predefined Functions, Programmer -defined Function, Local Variable, Function Overloading, Functions with Default Arguments, Call -By-Value and Call-By-Reference Parameters, Recursion.

UNIT III	ARRAYS	12+3

Introduction to Arrays, Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, Multi-Dimensional Arrays.

UNIT IV	STRUCTURES	12+3

Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures, Unions

UNIT V	FILES AND SEARCHING ALGORITHMS	12+3

Declaration and Initialization, Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions. Searching Algorithms - Linear Search, Binary Search. Use of files for data input and output. merging and copy files.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
60	15	0	0	75

TEXT BOOKS

1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.
2. Programming and problem solving with C++: brief edition, N. Dale and C. Weems, Jones & Bartlett Learning, 2010.

REFERENCES

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
2. Aho A.V. J.E. Hopcroft and J.D. Ullman., 2001. "The Design and Analysis of Computer Algorithms", Pearson Education Delhi. Second Edition.

E-REFERENCES

1. http://www.comptechdoc.org/basic/basictut/index.html
2. http://cse02-iiith.vlabs.ac.in/
3. http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106104128
4. http://www.nptel.ac.in
5. http://www.vlab.co.in

Table 1: Mapping of Cos with POs.

B.Sc CY	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	2	2	2				2	1
CO2	1			2				2	
CO3	1		2	1					
CO4	2	1	2	3				2	1
CO5	2		1	3				2	
Total	8	3	7	11				8	2
Scaled Value	2	1	2	3				2	1

1 -- 5 →1, 6 -- 10 → 2, 11--15 →3

0–No relation 1–Low relation 2–Medium relation 3–Strong relation

XCI 104			ALGEBRA, CALCULUS AND ANALYTICAL GEOMETRY	L	T	SS	C
				4	1	0	5
C	P	A		L	T	SS	H
4	0	0		4	1	0	5

PREREQUISITES	Basics of Mathematics		
COURSE OUTCOMES		**DOMAIN**	**LEVEL**
CO1	Evaluate the derivatives of given functions	Cognitive	Understand
CO2	Calculate the definite and indefinite integrals using various techniques.	Cognitive	Understand, Remember
CO3	Apply basic operations on matrices to find the inverse of a matrix	Cognitive	Understand, Apply
CO4	Solve problems using Binomial, exponential and logarithmic series expansions.	Cognitive	Understand
CO5	Calculate the distance between two points and explain section formulae, slope form and intercept form.	Cognitive	Understand

UNIT I – DIFFERENTIAL CALCULUS **12+3**

Derivative of a function – Various formulae – Product and quotient rule of differentiation – Differentiation of function of function (chain rule) – Trigonometric functions – Inverse trigonometric functions – Exponential function – Logarithmic functions – Logarithmic differentiation - Higher derivatives – Successive differentiation – Leibnitz theorem.

UNIT II – INTEGRAL CALCULUS **12+3**

Constant of integration – Indefinite integral – Elementary integral formulae – Methods of integration – Integration by substitution - Integration by parts – Integration through partial fractions – Concept of definite integral – Properties of definite integral.

UNIT III – MATRICES AND DETERMINANTS **12+3**

Definition and types of matrices – Matrix Operation – Determinants – Solution of system of linear equations by Matrix method.

UNIT IV – SERIES **12+3**

Binomial theorem for a rational index – Exponential and Logarithmic series – Summation of the above series.

UNIT V – TWO-DIMENSIONAL ANALYTICAL GEOMETRY **12+3**

Cartesian coordinate system – Introduction to polar coordinates – Distance between two points – Section formulae – Area of triangle – Locus and its equations – Straight line: Equation of a straight line parallel to an axis – slope form –normal form – Intercept form through two point –condition of concurrency of three lines.

LECTURE	TUTORIAL	SELF STUDY	PRACTICAL	TOTAL
60	15	15	0	75+15

TEXT BOOKS

1. T. K. ManicavachagomPillay, T. Natarajan, K. S. Ganapathy, Algebra, Volume I , S.Vishvanathan Printers and Publishers Pvt., Ltd, Chennai 2004.
2. S.Naravanan, T.K.ManicavachagamPillay, S.Vishvanathan, Calculus volume I & IIPrinters and Publishers Pvt., Ltd, Chennai 1991.

REFERENCES
1. P.Kandasamy&K.Thilagavathi, B.Sc Mathematics for branch I – Vol I &Vol II, S.Chand& Co, 2004.
E- REFERENCES
www.nptel.ac.in Advanced Engineering Mathematics, Prof. PratimaPanigrahi, Department of Mathematics, Indian Institute of Technology, Kharagpur.

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	**3**						**2**		
CO2	**3**						**2**		
CO3	**3**						**2**		
CO4	**3**						**2**		
CO5	**3**						**2**		
Total	**15**						**10**		
Scaled Value	**3**						**2**		

1-5→1, 6-10→2, 11-15→3

0 – No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation

XCI 105			Basics of Computers and Cyber crime	L	T	SS	C
				3	1	0	4
C	P	A		L	T	SS	H
2.8	0.2	0		3	1	0	4

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	*Recognize* the importance of computer system, applications	Cognitive Psychomotor	Understand Origination
CO2	*Identify* and *define* basic terms and concepts in computer hardware and peripheral devices	Cognitive Psychomotor	Understand Origination
CO3	*Establish* the relationship between hardware and software.	Cognitive Psychomotor	Apply Origination
CO4	*Identify* the IO devices. *Design* database using Libre Office (FOSS) Base.	Cognitive Psychomotor	Remembrance Origination
CO5	*Identify* the types of cyber crimes.	Cognitive	Understand

UNIT I	INRODUCTION	9+3

Introduction – Characteristics of computer – Evolution of computer- Generation of computer – classification of computer- The Computer system –Applications of computers. Number system-Binary Arithmetic

UNIT II	COMPUTER ARCHITECTURE	9+3

The Central processing unit (CPU) – Main Memory Unit – Interconnection Unit – Cache – Communication between various units of a computer system.

UNIT III	MEMORY	9+3

Primary memory : Memory representation – memory hierarchy - Random access memory – Types of Memory – Read only memory – types of ROM – **Secondary Memory** – Classification of secondary storage devices –Magnetic tape – Magnetic disk - Optical disk – Memory stick - Universal serial bus – Mass storage devices

UNIT IV	INPUT AND OUT PUT DEVICES	9+3

Input devices Types of input devices - Optical character recognition – Optical Mark recognition - Magnetic ink character recognition – Bar code reader – **Output devices** : Types of output - Classification of output devices - Terminals

UNIT V	Cyber Crime	9+3

Introduction-Classifications of Cybercrimes: E-Mail Spoofing-Spamming-Cyber defamation-Internet Time Theft-Newsgroup Spam-Crimes from Usenet Newsgroup-Industrial Spying-Industrial Espionage- Hacking-OnlineFrauds-PornographicOffenses-SoftwarePiracy-Password Sniffing-Credit Card Frauds and Identity Theft.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	0	0	60

TEXT BOOKS

1. Dorling Kindersley, 2011. Introduction to Computer Science ITL Education Solutions.
2. Nina Godbole, Sunit Belapur, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Publications, April, 2011.

REFERENCES

1. Roger Hunt and John Shelly, penguin Edition,2016. Computers and common sense, (PHI)

E-REFERENCES

1. https://nptel.ac.in/courses/106106092
2. https://www.legalserviceindia.com/legal/article-8311-an-introduction-to-cyber-crime.html

Table 1: Mapping of Cos with POs.

B.Sc	PO							PSO	
CY	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	2	2	2	1			2	1
CO2	1	2	2	2	1			2	
CO3	1		2	1	2				
CO4	2	1	2	3	1			2	1
CO5	2		1	3				2	
Total	8	5	9	11	5			8	2
Scaled Value	2	1	2	3	1			2	1

1 -- 5 →1, 6 -- 10 → 2, 11--15 →3

0–No relation 1–Low relation 2–Medium relation 3–Strong relation

Course Code	XCI 106	L	T	P	C
Course Name	Programming Methodologies Lab	0	0	1	2
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	3	3

1. Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following:
   a. To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.
2. Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following :
3. Learn how to use functions and parameter passing in functions, writing recursive programs.
4. **Write Programs to learn the use of strings and string handling operations**.
5. . Problems which can effectively demonstrate use of Arrays. Structures and Union.
6. Write programs using pointers
7. .Write programs to use files for data input and output.
8. .Write programs to implement search algorithms.

B.Sc	PO							PSO	
CY	1	2	3	4	5	6	7	1	2
CO1	1	1	1	2	1			2	1
CO2	1	2	2	2	1			2	
CO3	1		1	1	2				
CO4	2	1	2	3	1			2	1
CO5	2		1	3				2	
Total	8	5	9	11	5			8	2
Scaled Value	2	1	2	3	1			2	1

1 -- 5 →1, 6 -- 10 → 2, 11--15 →3

0–No relation 1–Low relation 2–Medium relation 3–Strong relation

Course Code	XCI 107	L	T	P	C
Course Name	Office Automation Lab	0	0	1	2
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	2	2

1. Paragraph formatting, line spacing, and sorting, Bullets and Numbering
2. Table creation
3. Business Card
4. Resume Creation
5. Mail Merge
6. Employee Pay Details
7. Grade of a student
8. Charts in Excel
9. Power point presentation - Create Text And Images With Effects
10. Power point presentation -Create Animation And Sound Effects

COURSE CODE	XUMA001	L	T	P	SS	C
COURSE NAME	HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY	2	0	0	1	0
PREREQUISITES	-	L	T	P	SS	H
C:P:A	1.5:0:0.5	2	0	0	1	3

COURSE OUTCOMES		Domain	Level
CO1	***Relate*** and ***Interpret*** the human ethics and human relationships	Cognitive	Remember
CO2	***Explain*** and ***Apply*** gender issues, equality and violence against women	Cognitive	Understanding, Applying
CO3	***Classify*** and ***Develop*** the identify of human rights and their violations	Cognitive Affective	Analyzing Receiving
CO4	***Classify***and ***Dissect*** necessity of human rights and report on violations.	Cognitive	Understanding, Analyze
CO5	***List*** and **respond** to family values, universal brotherhood, fight against corruption by common man and good governance.	Cognitive Affective	Remember, Respond

UNIT I HUMAN ETHICS AND VALUES	6+3
Human Ethics and values - Understanding of oneself and others- motives and needs- Social service, Social Justice, Dignity and worth, Harmony in human relationship: Family and Society, Integrity and Competence, Caring and Sharing, Honesty and Courage, WHO's holistic development - Valuing Time, Co-operation, Commitment, Sympathy and Empathy, Self-respect, Self-Confidence, character building and Personality.	
UNIT IIGENDER EQUALITY	**6+3**
Gender Equality - Gender Vs Sex, Concepts, definition, Gender equity, equality, and empowerment. Status of Women in India Social, Economic, Education, Health, Employment, HDI, GDI, GEM. Contributions of Dr.B.R. Ambetkar, ThanthaiPeriyar and Phule to Women Empowerment.	
UNIT IIIWOMEN ISSUES AND CHALLENGES	**6+3**
Women Issues and Challenges- Female Infanticide, Female feticide, Violence against women, Domestic violence, Sexual Harassment, Trafficking, Access to education, Marriage. Remedial Measures – Acts related to women: Political Right, Property Rights, and Rights to Education, Medical Termination of Pregnancy Act, and Dowry Prohibition Act.	
UNIT IV HUMAN RIGHTS	**6+3**
Human Rights Movement in India – The preamble to the Constitution of India, Human Rights and Duties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economic, Social and Cultural Rights, Rights against torture, Discrimination and forced Labor, Rights and protection of children and elderly. National Human Rights Commission and other statutory Commissions, Creation of Human Rights Literacy and Awareness. - Intellectual Property Rights (IPR). National Policy on o**ccupational safety, occupational health and working environment.**	
UNIT V GOOD GOVERNANCE AND ADDRESSING SOCIAL ISSUES	**6+3**
Good Governance - Democracy, People's Participation, Transparency in governance and audit,	

Corruption, Impact of corruption on society, whom to make corruption complaints, fight against corruption and related issues, Fairness in criminal justice administration, Government system of Redressal. Creation of People friendly environment and universal brotherhood.

LECTURE	TUTORIAL	SELF STUDY	PRACTICAL	TOTAL
30	0	15	0	45

Textbook

1. Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).
2. Mani. V. S., Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human Rights, 1998).
3. Singh, B. P. Sehgal, (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep, 1999).
4. Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)
5. Veeramani, K. (ed) Periyar Feminism, (PeriyarManiammai University, Vallam, Thanjavur: 2010).

Reference Books

1. Bajwa, G.S. and Bajwa, D.K. Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications, 1996).
2. Chatrath, K. J. S., (ed.), Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies, 1998).
3. Jagadeesan. P. Marriage and Social legislations in Tamil Nadu, Chennai: Elachiapen Publications, 1990).
4. Kaushal, Rachna, Women and Human Rights in India (New Delhi: Kaveri Books, 2000)

E-Reference

1. http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p
2. http://cvc.nic.in/welcome.html.
3. https://www.transparency.org/
4. https://www.hrw.org/world-report/2015/country-chapters/india

II SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 3	XGT201/ XFT201	Tamil – II / Foundation Tamil - II	2	1	0	0	**3**	2	1	0	0	3
AECC 4	XGE202	English – II	2	1	0	0	**3**	2	1	0	0	3
CC- 2A	XCI203	Data Structures	3	1	0	0	**4**	3	1	0	0	4
DSC -2	XCI204	Discrete Mathematics	4	1	0	0	**5**	4	1	0	0	5
CC- 2B	XCI205	Python Programming	3	1	0	0	**4**	3	1	0	0	4
CC-2C	XCI206	Data Structures Lab	0	0	1	0	**1**	0	0	3	0	3
CC-2D	XCI207	Python Programming Lab	0	0	1	0	**1**	0	0	2	0	2
UMAN-2	XUMA002	Environmental Studies	2	0	0	0	**2**	2	0	0	0	2
EA		Extension Activities NSS,NCC,NSO,RRC and Swatch Bharath)	0	0	0	0	**0**	2	0	0	0	2
	Mentor Library hours										2	2
		Total	**16**	**5**	**2**	**0**	**23**	**19**	**4**	**8**	**1**	**30**

XGE202			ENGLISH II	L	T	P	SS	C
				2	1	0	0	3
C	P	A		L	T	P	SS	H
1.5	0	0.5		2	1	0	0	4

PREREQUISITE: Nil

COURSE OUTCOMES		DOMAIN	LEVEL
On the successful completion of this course students would be able to			
CO1	***Recall*** the basic grammar and using it in proper context	Cognitive	Remembering
CO2	***Explain*** the process of listening and speaking	Cognitive	Understanding
CO3	***Adapt*** important methods of reading	Cognitive	Creating
CO4	***Demonstrate*** the basic writing skills	Cognitive	Understanding

UNIT I	**Advanced Reading**	**6**

i. Reading texts of different genres and of varying length ii. Different strategies of comprehension iii. Reading and interpreting non-linguistic texts iv. Reading and understanding incomplete texts (Cloze of varying lengths and gaps; distorted texts.)

UNIT II	**Advanced Writing**	**6**

v. Analysing a topic for an essay or a report vi. Editing the drafts arrived at and preparing the final draft vii. Re-draft a piece of text with a different perspective (Manipulation exercise) viii. Summarise a piece of prose or poetry ix. Using phrases, idioms and punctuation appropriately

UNIT III	**Principles of communication and communicative competence**	**6**

x. Introduction to communication – principles and process xi. Types of communication – verbal and non-verbal xii. Identifying and overcoming problems of communication
xiii. Communicative competence

UNIT IV	**Cross Cultural Communication**	**6**

xiv. Cross-cultural communication

LECTURE	TUTORIAL	SELF STUDY	PRACTICAL	TOTAL
30	0	30	0	60

REFERENCES:

1) Bailey, Stephen (2003). Academic Writing. London and New York, Routledge.
2) Department of English, Delhi University (2006). Fluency in English Part II. New Delhi, OUP
3) Grellet, F (1981). Developing Reading Skills: A Practical Guide to Reading Skills. New York, CUP
4) Hedge, T. (2005). Writing. London, OUP
5) Kumar, S and Pushp Lata (2015). Communication Skills. New Delhi, OUP
6) Lazar, G. (2010). Literature and Language Teaching. Cambridge, CUP
7) Nuttall, C (1996). Teaching Reading Skills in a Foreign Language. London, Macmillan
8) Raman, Meenakshi and Sangeeta Sharma (2011). Technical Communication: Principles and Practice. New Delhi, OUP

XCI 203- DATA STRUCTURES

XCI 203			DATA STRUCTURES	L	T	SS	C
				3	1		4
C	P	A		L	T	SS	H
3	1	0		3	1		4

PREREQUISITE: Computer Programming

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Explains*** the concept of data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles	Cognitive Psychomotor	Understand Apply
CO2	***Choose*** To have a knowledge of complexity of basic operations like insert, delete, search on these data structures	Cognitive	Remember
CO3	Ability to choose a data structure to suitably model any data used in computer applications	Cognitive Psychomotor	Apply Set
CO4	Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.	Cognitive	Analyze
CO5	Ability to assess efficiency tradeoffs among different data structure implementations. Implement and know the applications of algorithms for sorting, pattern matching etc.	Cognitive	Create

UNIT I	**INTRODUCTION**	**9+3**

Basic concepts- Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction Performance analysis, Linear and Non-Linear data structures, Singly Linked Lists-Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations. Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

UNIT II	**LINEAR DATA STRUCTURES**	**9+3**

Stack- Operations, Array and Linked Implementations, Applications- Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation, Queue- Definition and Operations, Array and Linked Implementations, Circular Queues - Insertion and Deletion Operations, Dequeue (Double Ended Queue).

UNIT III	**TREES**	**9+3**

Trees, Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees, Priority Queue- Implementation, Heap- Definition, Insertion, Deletion.

UNIT IV	**GRAPHS**	**9+3**

Graphs, Graph ADT, Graph Representations, Graph Traversals, Searching, Static Hashing- Introduction, Hash tables, Hash functions, Overflow Handling. Sorting

Methods, Comparison of Sorting Methods.		
UNIT V	**ALGORITHM DESIGN TECHNIQUES**	**9+3**
Search Trees- Binary Search Trees, AVL Trees- Definition and Examples.Red-Black and Splay Trees, Comparison of Search Trees, Pattern Matching,Algorithm- The Knuth-Morris-Pratt Algorithm, Tries (examples).		

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	**15**	**45**		**60+45**

REFERENCES:

1. Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
2. Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson
3. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
    1. www.tutorialspoint.com
    2. www.nptel.com
    3. www.virtuallab.ac.in
    4. Lecture Slides, Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html
    5. Lecture Slides : http://www.mhhe.com/engcs/compsci/forouzan/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO 1	3	3	2	2	2	1	2
CO 2	3	3	2	2	2	1	2
CO 3	3	2	2	2	2	1	2
CO 4	3	3	2	2	2	1	2
CO 5	3	2	2	2	2	1	2
Total	15	13	10	10	10	5	10
Course	3	3	2	2	2	1	1

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

COURSE CODE	XCI204	L	T	P	SS	C
COURSE NAME	DISCRETE MATHEMATICS	3	1	0	2	6
PREREQUISTE	NIL	L	T	P	SS	H
C:P:A	3:0:0	3	1	0	2	6

Course Outcome		Domain	Level
CO1	*Define* the properties and laws of sets, relations and functions and*Apply* the operation of the sets using venDiagram.	Cognitive	R, Ap
CO2	*Apply*the concepts of logic and to find the normal forms. *Explain* the tautologies and Contradiction.	Cognitive	U, Ap
CO3	*Apply* the counting principle permutation and combination and to *solve* the problem. *Explain* the pigeonhole principle.	Cognitive	U, Ap
CO4	*Explain* the types of lattices and to*show* lattices as partially ordered sets.	Cognitive	U, Ap
CO5	*Apply* **the** properties of semi groups and groups and Explain any set with binary operation as a semigroup and group with examples.	Cognitive	U, Ap

UNIT I	12
Set notations – Basic definitions and set operations – Venn diagram – Algebraic laws of set theory – D Morgan's law. Relations: Properties of relations – Types of relations – Equivalence classes. Functions: Definition – Domain – Range and types of function- Classification of function.	
UNIT II	**12**
Statements - Normal forms – CNF – DNF – PCNF - PDN – Tautologies - Contradictions.	
UNIT III	**12**
Counting principles – The Pigeonhole principle – Counting – Permutations and Combinations – Combinatorial arguments – Countable and uncountable sets.	
UNIT IV	**12**
Lattices as partially ordered set – Types of lattices – Lattices as algebraic system.	
UNIT V	**12**
Binary operations – Semi groups - Groups – Examples and elementary properties.	

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	0	30	60 + 30

TEXT BOOK

1. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, Delhi, 2002.
2. Kenneth Levasseur and Alan Doerr, "Applied Discrete Structures**,** Department of Mathematical Sciences, University of Massachusetts Lowell, Version 2.0, **2013**.

REFERENCES

1. Kenneth H.Rosen, "Discrete Mathematics and its Application", Fifth edition, Tata McGraw-Hill Publishing company pvt.Ltd., New Delhi, 2003.
2. Dr.M.K.Venkataraman, Dr.N.SridharanN.Chandrasekaran, "Discrete Mathematics", the National Publishing Company, 2003.

3. Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics", 10th edition,Tata McGraw Hill Companies,2010.

E REFERENCES

1. www.nptel.ac.in
2. Graph Theory A NPTEL Course S.A. Choudum.
3. Graph Theory by Prof. L. Sunil Chandran Computer Science and Automation Indian Institute of Science, Bangalore.

Mapping of CO's with PO's:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1				1	
CO2	3	1	1			1	
CO3	3		1			1	
CO4	3					1	1
CO5	3					1	1

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XCI205- PYTHON PROGRAMMING

XCI205			Python Programming	L	T	P	SS	C
				3	0	1		4
C	P	A		L	T	P	SS	H
3	1	0		3	0	3		6

PREREQUISITE: Computer Programming

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	Understand Nuances and paradigms of Programming	Cognitive	Knowledge Comprehension
CO2	Understand Object Oriented Programming methods	Cognitive	Knowledge Comprehension
CO3	***Build*** *Graphical User Interface using Tkinter*	Cognitive Psychomotor	Application Synthesis
CO4	***Build*** **and** *Deploy* web apps using Flask	Cognitive Psychomotor	Application Synthesis
CO5	***Develop*** 2-dimensional Games using Pygame	Cognitive Psychomotor	Application Synthesis

UNIT I	Fundamentals of Python	3

Introduction to Programming - What is Computing? - Various Programming Paradigms - What is a Programming Language? - Compilers Vs Interpreters - Introduction to Python Programming - Why Python Programming language - Applications of Python Programming language - Essential Tools for Python Developer - Installation of Anaconda Environment - Handling of Jupyter Notebooks - Fundamentals of Python Programming – Variables & Assignments - Multiple assignment concept - Printing Strings in Python - Executing sequence of statements - User Input - Representing Data In Python – I - Numerical Types - Handling Arrays In python - Array Manipulation - Lists in Python - List Manipulation - Strings in PythonRepresenting Data in Python – II – Tuples - Sets & Frozen sets – Dictionarie

UNIT II	Control Structure and Functional programming	3

Control Flow in Python - Conditional Statements - If statements - Rules of Indentation - If else statement - Elif Statement - Nested If statement - Rule Based Expert Systems -Control Flow in Python – Loops - When to use loops - For loop - While loop - Break and continue statement - Functions and Functional Programming-I - Understand Function execution - Create simple functions in Python - Functional Programming tools - Functions and Functional Programming-II - Lambda functions - Map and filters - Iterators, generators - Modules and Packages - Working with existing Packages in Python

UNIT III	Object Oriented Programming	3

Object Oriented Approach - Terminology in Object Oriented Programming - Introduction to Classes and Objects - Working with Custom classes - Parent Class Vs Child Class - Attributes and Methods – Encapsulation - Inheritance and Polymorphism

- Controlling Attribute access – Functors - Class Descriptors - Multiple Inheritance - Meta classes – Algorithms in Python - What is an Algorithm? - Algorithm Vs Problems
- How to write an Algorithm - - Introduction to Search algorithms - Fundamentals of Graph theory - Representing Problems as a graph - Graph traversal

UNIT IV	Python Applications - Graphical User Interface	3

Introduction to Graphical User Interface – I - What is a Graphical User Interface? - Introduction to Tkinter - Fundamental operations in Tkinter - Creating simple interfaces in python using Tkinter – Build GUI using Tkinter - Building a Dialog style program - Building a Main window style interface - Advanced Functions in Tkinter - Create a student data management system - Developing a Forward Kinematic Model GUI in python

UNIT V	Game And Web Development in Python	3

Game Development in Python - Introduction to Game development - Game development Pipeline - Game frameworks and libraries in python - Fundamentals of Pygame – Building Games with Pygame - Event types, Information and queue - Pygame modules - Web services in Python - Introduction to web development - Various python frameworks for web development - RESTful API services p Introduction to Flask - Implementing a Flask Webservice – Building a Flask Application - Handling JSON files - Encoding information in JSON - Setting up services - Build a personal profile in flask

LECTURE	TUTORIAL	PRACTICAL	Total hours
15	0		60

TEXT BOOKS:

Campbell, Gries, Montojo, and Wilson, Practical Programming: An Introduction to Computer Science Using Python. The Pragmatic Bookshelf, 2009

REFERENCES:

Mark Newmann: Computational Physics with Python, 2nd Ed. (2012)
J. M. Stewart: Python for Scientists, Cambridge Univ. Press (2014)

E-REFERENCES:

Guttag, John. Introduction to Computation and Programming Using Python: With Application to Understanding Data Second Edition. MIT Press, 2016. ISBN:9780262529624

Mapping of CO's with PO's:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1		1	2	1	
CO2	3	1	1	1		1	
CO3	3		1		2	1	
CO4	3			1		1	1
CO5	3	1	1		2	1	1
	15	3	3	3	6	5	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XCI206- DATA STRUCTURES LAB

XCI206			DATA STRUCTURES LAB	L	T	P	SS	C
						3		3
C	P	A		L	T	P	SS	H
0	1	0				3	Z	3

PREREQUISITE: Computer Programming

Course Outcomes	Domain	Level
UNIT I	**INTRODUCTION**	**9+3+ 9**

Lab

Write program that uses functions to perform the following:

1) Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.
2) Implement the operations, insertion, deletion at a given position in the list and search for an element in the list
3) To display the elements in forward / reverse order
4) Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion)
5) Write a program to implement queue data structure and basic operations on it (Insertion, deletion, find length) and code at least one application using queues
6) Write a program that uses well defined functions to Create a binary tree of elements and Traverse a Binary tree in preorder, inorder and postorder.
7) Write program that implements linear and binary search methods of searching for an element in a list.
8) Write and trace programs to understand the various phases of sorting elements using the methods.
   a) Insertion Sort b) Quicksort c) Bubble sort
9) Write and trace programs to Create a Binary search tree and insert and delete from the tree.
10) Represent suitably a graph data structure and demonstrate operations of traversals on it.

XCI207- PYTHON PROGRAMMING LAB

Course Code	XCI207	L	T	P	C
Course Name	PYTHON PROGRAMMING LAB	0	0	4	2
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	4	4
					60

1.Handling Jupyter notebooks
2.Data types in Python – I
3.Data Types in Python - II
4.Executing Conditional Statements in Python
5.Executing For loop and its variants in Python
6.Executing While loop in python
7.Building an Expert System in Python
8.Functional Programming in Python
9.Creating Modules in Python
10.Handling XML files in Python
11.Modelling an Expert system with Classes
12.Implementation of Binary Search in Python
13.Implementation of Bubble sort in python
14.Implementation of Breadth First Search
15.Implementation of Depth First Search in Python
16.Working with Bellman-Ford Algorithm in Python
17.Fundamentals of Tkinter
18.Building a simple Calculator using Tkinter
19.Building a student information system using Tkinter
20.Fundamentals of Pygame
21.Build a simple snake game in python
22.Creating a star ship meteors game in Pygame
23.Fundamentals of Flask
24.Build a student Digital Profile using FLASK

XUMA002			ENVIRONMENTAL STUDIES	L	T	P	SS	C
				0	0	0	0	0
C	P	A		L	T	P	SS	H
1.5	0	0.5		2	0	0	1	3

PREREQUISITE : Nil

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Describe*** the significance of natural resources and ***explain*** anthropogenic impacts.	Cognitive	Remember Understand
CO2	***Illustrate*** the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.	Cognitive	Understand
CO3	***Identify*** the facts, consequences, preventive measures of major pollutions and ***recognize*** the disaster phenomenon	Cognitive Affective	Remember Receiving
CO4	***Explain*** the socio-economic, policy dynamics and***practice*** the control measures of global issues for sustainable development.	Cognitive	Understand
CO5	the impact of population and the concept of various welfare programs, and ***apply*** themodern technology towards environmental protection.	Cognitive	Understand Apply

UNIT I	**INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY**	**6**

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, flood, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

UNIT II	**ECOSYSTEMS AND BIODIVERSITY**	**6**

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d)

Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III	ENVIRONMENTAL POLLUTION	6

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 urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: flood, earthquake, cyclone and landslide.

UNIT IV	SOCIAL ISSUES AND THE ENVIRONMENT	6

Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V	HUMAN POPULATION AND THE ENVIRONMENT	6

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education - HIV / AIDS – Women and Child welfare programme– Role of Information Technology in Environment and human health – Case studies.

Lecture	Tutorial	Self-Study	Practical	Total
30	0	15	0	45

Text book

1. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, 2000.
2. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, 2003

Reference Books

1. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, 2003.
2. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, 2006.
3. Introduction to International disaster management, Butterworth Heinemann, 2006.
4. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, 2004.
5. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, 2009.
6. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
7. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, 2012.
8. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, 2003.

9. Sundar, Disaster Management, Sarup& Sons, New Delhi, 2007.
10. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, 2006.

E-references

1. http://www.e-booksdirectory.com/details.php?ebook=10526
2. https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science
3. https://www.free-ebooks.net/ebook/What-is-Biodiversity
4. https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4
5. http://bookboon.com/en/pollution-prevention-and-control-ebook
6. http://www.e-booksdirectory.com/details.php?ebook=8557
7. **http://www.e-booksdirectory.com/details.php?ebook=6804**

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	2						2		2	2
CO2	1						2			2
CO3	2	1	2				3		2	3
CO4	2	2	2				2			3
CO5	2				3	3				2
	9	**3**	**4**		**3**	**3**	**9**		**4**	**12**
Scaled value	**2**	**1**	**1**		**1**	**1**	**2**		**1**	**3**

XCI 303			ALGORITHMS	L	T	P	SS	C
				2	0	**0**	0	**2**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
2		**1**		2	0	**0**	1	**2**

PREREQUISITE: XBC105

COURSE OUTCOMES		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize***to learn good principles of algorithm design.	Cognitive Psychomotor	Remember Perception
CO2	***Identify*** and ***Achieve*** to learn how to analyses algorithms and estimate their worst -case and average- case behavior (in easy cases);	Cognitive Psychomotor	Understand Set
CO3	***Illustrate*** and ***practice*** to become familiar with fundamental data structures and with the manner in which these data structures can best be implemented;	Cognitive Psychomotor	Apply Guided Response
CO4	***Demonstrate*** To learn how to apply their theoretical knowledge in practice (via the practical component of the course).	Cognitive Psychomotor	Apply Mechanism
CO5	***Develop*** and ***Maintain***Advanced Analysis Technique	Cognitive Psychomotor	Create Complete Overt

UNIT I	**INTRODUCTION**	**9**
Introduction: Basic Design and Analysis Techniques of Algorithms, Correctness of Algorithm. Algorithm Design Techniques: Iterative Techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.		
UNIT II	**SORTING AND SEARCHING TECHNIQUES**	**9**
Elementary Sorting techniques– Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques- Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques- Medians & Order Statistics, complexity analysis.		
UNIT III	**GRAPHS ALGORITHMS**	**9**
Graphs Algorithms: Graph Algorithms– Breadth First Search, Depth First Search and its Applications, Minimum Spanning Trees. String Processing		
UNIT IV	**LOWER BOUNDING TECHNIQUES**	**9**
Lower Bounding Techniques: Decision Trees, Balanced Trees, Red-Black Trees		
UNIT V	**ADVANCED ANALYSIS TECHNIQUE**	**9**
Advanced Analysis Technique: Randomized Algorithm, Distributed Algorithm, Heuristics.Binary Search Tree Problem.		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
30	**15**	**0**	**0**	**45**

TEXT BOOKS:

1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithms, PHI, 3rd Edition 2009.

2. Sara basse & A.V. Gelder Computer Algorithm – Introduction to Design and Analysis, Publisher – Pearson 3rd Edition 1999

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2007.
2. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, "Computer Algorithms", Galgotia Publications Pvt. Ltd., 2002
3. A.V. Aho, J.E. Hopcroft and J.D. Ullman "Data Structures and Algorithms" Pearson Education Delhi, 2002

E-REFERENCES:

1. www.tutorialspoint.com
2. www.nptel.com
3. www.virtuallab.ac.inLecture Slides,
4. Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html
5. Lecture Slides : http://www.mhhe.com/engcs/compsci/forouzan/

Mapping of COs with Pos

B.Sc CY	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3				1				
CO2	2	3							
CO3	1	3	3	2	2				
CO4	1	3	3	2	2	3	2		
CO5		3	3	3	2	3	2	2	3
Total	7	12	9	7	7	6	4	2	3
Scaled Value	2	3	2	2	2	2	1	1	1

1-5 → 1, 6 -10 → 2, 11 -15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 304 Data Communication and Networking

XCI 304			Data Communication and Networking	L	T	P	SS	C
				4	0	0	0	4
C	P	A		L	T	P	SS	H
3	0	1		4	0	0	0	4

PREREQUISITE: XBC105

	COURSE OUTCOMES	Domain	Level
After the completion of the course, students will be able to			
CO1	Understand the concept of Computer networks and Data Transmission.	Cognitive	Comprehension Knowledge Analysis
CO2	Illustrate basic reference models with layers and interfaces.	Cognitive Psychomotor Affective	Synthesis Evaluation Application
CO3	Understand different types of protocols used for transmission of data.	Psychomotor Affective	Knowledge Comprehension Application Evaluation
CO4	Understanding about routing and addressing, Apply Algorithm for congestion control.	Psychomotor	Application Evaluation Synthesis
CO5	Analyze media access control techniques and data flow , Distinguish the functionalities of different Layers. Examine problems of a computer networks	Cognitive Psychomotor	Knowledge Evaluation Application

UNIT I	**INTRODUCTION TO DATA COMMUNICATION**	**9+3**

Computer Network- Advantages and Disadvantages of Computer Network- Communication systemAnalog and digital data-Network as platform- The Elements of Network- Converged network- The Architecture of Internet- Trends in Networking- Data Transmission- Analog Transmission- Digital Transmission-Transmission impairment- Introduction to LANs, WANs and Internetworks.

UNIT II	**APPLICATION LAYER AND TRANSPORT**	**9+3**

LAYER Application Layer Functionality and Protocols- Introduction, making provision for applications and services- Application layer protocols and services- OSI Transport Layer- The TCP protocol – communicating with reliability, Managing TCP sessions-The UDP protocol communicating with low overheads.

UNIT III	**DATA LINK LAYER AND PHYSICAL LAYER**	**9+3**

UNIT III NETWORK LAYER AND ADDRESSING 12 OSI Network Layer- Introduction, Networks- dividing host into groups, Routing –How our data packets are handled- Routing process- Congestion Control Algorithm-Addressing the Network - IPv4, Introduction-Address for different purpose- Assigning address- Calculating address- testing the Network 24 layer, Subnetting.

UNIT IV	**DATA LINK LAYER AND PHYSICAL LAYER**	**9+3**

Introduction-Data Link Layer-Accessing the media -Media Access Control Techniques-Media Access Control Addressing and Framing Data- Flow Control- Stop and Wait-Sliding Window- Error DetectionError Control-HDLC Physical Layer-Data Encoding- D igital data-digital signals-Analog signals- Analog data- Synchronous and Asynchronous transferMultiplexing- Frequency division multiplexing- Time division multiplexing Transmission- Twisted pairCoaxial cable- Optical Fibers- Wireless transmission- Microwaves- Radio waves- Infrared.

UNIT V	**ETHERNET AND CASE STUDY**	**9+3**

Overview of Ethernet, Ethernet Communication through the LAN- The Ethernet Frame-Ethernet

Media Access Control- Ethernet Physical Layer- Hubs and Switches-Address Resolution Protocol(ARP)- Case Study on Planning and Cabling Networks - LANs-Making the Physical connections- Device Selection Factors- Device Interconnecting.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
30	**15**	**0**	**15**	**60**

TEXT BOOKS:

1. 1. Behrouz Forouzan, "Data Communications and Networking", Edition 5, Tata McGraw-Hill., 2012.
2. Andrews S. Tanenbaum, David J Wetherall, "Computer Networks", Edition 5, Pearson Education, 2012.
3. William Stallings, "Data & Computer Communications", PHI, Edition 6, 2012.
4. Jerry Fitzgerald, Alan Dennis, "Business Data Communications & Networking" , John Wiley & Sons Inc, 2010.

REFERENCES:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2007.
2. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, "Computer Algorithms", Galgotia Publications Pvt. Ltd., 2002
3. A.V. Aho, J.E. Hopcroft and J.D. Ullman "Data Structures and Algorithms" Pearson Education Delhi, 2002

E-REFERENCES:

1. www.tutorialspoint.com
2. www.nptel.com
3. www.virtuallab.ac.inLecture Slides,
4. Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html
5. Lecture Slides : http://www.mhhe.com/engcs/compsci/forouzan/

Mapping of COs with Pos

B.Sc CY	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3		2		1	2			1
CO2	2	3	1	1	1	1		1	
CO3	1	3	2	2	2	1	1		1
CO4	1	3	2	2	2	2	1	1	
CO5		3	3	3	2	2	2	2	2
Total	7	12	10	8	8	8	4	4	4
Scaled Value	2	3	2	2	2	2	1	1	1

1-5 → 1, 6 -10 → 2, 11 -15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 305- DATA BASE MANAGEMENT SYSTEM

XCI305			DATA BASE MANAGEMENT SYSTEM	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
3	0	0		3	0	0	0	3

PREREQUISITE: Computer Fundamentals

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Build*** the concept of DBMS programming and its fundamental	**Cognitive**	Remember Knowledge
CO2	***Build*** an application program using concepts. ***Explain*** and ***implement*** the normalization concept for a table of data	**Cognitive**	Remember Understand
CO3	***Develop*** an application program using a data model ***Develop*** the query technical processing in database managements	**Cognitive**	Knowledge
CO4	Students gain much needed knowledge pertaining to relational database management systems, data models, SQL query processing,	**Cognitive Affective**	Understand Apply
CO5	To understand the big data platform and its use cases **implementation techniques**. Apply analytics on structured and unstructured data.	**Cognitive Affective**	Understand Apply

UNIT I	**INTRODUCTION**	**9 Hrs**

Basic Database Concepts, Terminology, and Architecture; Types of Database Management Systems. Differences between Relational and other Database Models. Data Modelling: Relations, Schemas, Constraints, Queries, and Updates; Conceptual vs. Physical Modeling; Entity Types, attributes, ER Diagrams.

UNIT II	**RELATIONAL DATABASES**	**9 Hrs**

SQL Data Definition: Specifying Tables, Data Types, Constraints; Simple SELECT, INSERT, UPDATE, DELETE Statements; Complex SELECT Queries, including Joins and Nested Queries; Actions and Triggers; Views; Altering Schemas. Relational Algebra: Definition of Algebra; Relations as Sets; Operations: SELECT, PROJECT, JOIN, etc. Normalization Theory and Functional Dependencies, 2NF, 3NF, BCNF, 4NF, 5NF.

UNIT III	**DATABASE DESIGN**	**9 Hrs**

Indexing: Files, Blocks, and Records, Hashing; RAID; Replication; Single-Level and Multi-Level Indexes; B-Trees and B+-Trees. Query Processing Translation of SQL into Query Plans; Basics of Transactions, Concurrency and Recovery.

UNIT IV	**TRANSACTION MANAGEMENT**	**9 Hrs**

DATABASE PROGRAMMING: Embedded SQL; Dynamic SQL, JDBC; Avoiding Injection Attacks; Stored Procedures; Lightweight Data Access Layers for Python and JavaScript Applications; PHP and MySQL, Object Relational Modeling: Hibernate for Java, Active Record for Rails.

UNIT V	**IMPLEMENTATION TECHNIQUES**	**9 Hrs**

BIG DATA: Motivations; OLAP vs. OLTP; Batch Processing; MapReduce and Hadoop; Spark; Other Systems: HBase. Working with POSTGRES, REDIS, MONGO, and NEO:

Setting up the same Database on Four Platforms; Basic Queries and Reporting.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
45	**0**	**0**	**0**	**45**

REFERENCES:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, 2011"Database System Concepts", Sixth Edition, Tata McGraw Hill.
2. RamezElmasri, Shamkant B. Navathe., 2008. "Fundamentals of Database Systems", Fifth Edition, Pearson.
3. Raghu Ramakrishnan., 2010. "Database Management Systems", Fourth Edition, Tata McGraw Hill.
4. G.K.Gupta, 2011."Database Management Systems", Tata McGraw Hill.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	0	1	2	0	1	0	0	3	3
CO2	0	1	1	1	0	0	0	1	1
CO3	1	3	1	1	1	0	0	3	3
CO4	1	3	2	1	1	1	1	3	3
CO5	3	3	2	2	1	1	1	3	2
Average	1	2	2	1	1	0	0	3	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 306: Auxillary Physics

XCI306			AUXILLARY PHYSICS	L	T	P	SS	C
				3	1	1	0	5
C	P	A		L	T	P	SS	H
3	1	0		3	1	3	0	7

PREREQUISITE: Students with fundamental physics knowledge in HSC or SSLC level.

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

	Course Outcome	Domain	Level
CO1	***State*** the basics of laser and ***distinguish*** the various laser systems and ***identify*** various optical fiber and source and detector.	Cognitive	Knowledge, Analyze
CO2	***Recall the s***emiconductor fundamentals and ***Explain***characterization and applications.	Cognitive	Knowledge, Comprehension
CO3	***Know*** the basics of operational amplifier and ***Construct***various oscillators ***Explain*** various applications	Cognitive, Psychomotor	Knowledge, Analysis, Set
CO4	***Understand*** the digital and gate principles ***distinguish*** Boolean algebra from algebra.	Cognitive	Knowledge
CO5	***Know*** the basics of IC's ***understand***the fabrication methods of IC's	Cognitive	Perception, Knowledge

UNIT - I :	LASER PHYSICS	12+3

Principles of laser– population inversion – meta stable state – conditions for laser actions - Types –Nd-Yag – CO2 laser – Helium – neon laser – applications of lasers.

UNIT - II :	FIBER OPTICS PHYSICS	12+3

Principle and propagation of light in optical fibers – Numerical Aperture and acceptance angle – Types of optical fibers – Source & detector – LED sensor – Block diagram fiber optics communication system – Applications.

UNIT - III :	SEMICONDUCTOR PHYSICS	12+3

Semiconductor fundamentals – Properties – Types of semiconductor– Volt – Ampere Characteristics of P-N junction Diode – Zener diode – applications of Zener diodes - Volt – Ampere Characteristics of common emitter NPN transistor, FET, UJT and SCR – Principles of LED and LCD.

UNIT - IV :	OPERATIONAL AMPLIFIER	12+3

Operational amplifier characteristics – inverting and non-inverting amplifier– adder, subtractor, integrator and differentiator circuits – Wien bridge oscillator – Phase shift oscillators and Twin-T oscillators

XCI 307 Communication Lab

XCI307	Communication Lab	L	T	P	C
		0	0	1	1
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	1	2

Course Outcomes		Domain	Level
CO1	Describe key terminologies, concepts and techniques employed in Statistical Analysis.	Cognitive	Comprehension Knowledge
CO2	***Build*** an application program using Conditional Statements concepts	Cognitive Psychomotor Affective	Synthesis Evaluation Application
CO3	***Develop*** an application program using a Modules ***Develop*** the query technical processing in database managements	Cognitive Psychomotor Affective	Knowledge Comprehension Application Evaluation
CO4	***Explain*** and ***Implement*** the Binary Search, Breadth First Search , Bubble sort concept in Python .Working with Bellman-Ford Algorithm in Python	Cognitive Psychomotor	Application Evaluation Synthesis
CO5	Apply the student Digital Profile using FLASK,Creating a star ship meteors game in Pygame	Cognitive Psychomotor	Knowledge Evaluation Application

60

LIST OF PROGRAMS:

1. To detect Errors using Vertical Redundancy Check (VRC).
2. To detect Errors using Longitudinal Redundancy Check (LRC).
3. To detect Errors using Cyclic Redundancy Check (CRC).
4. Socket programming to implement Asynchronous Communication.
5. Socket programming to implement Isochronous Communication.
6. To implement Stop & Wait Protocol.
7. To implement Sliding Window Protocol.
8. To implement the Shortest Path Routing using Dijkstra algorithm.
9. Socket Programming to Perform file transfer from Server to the Client.
10. To implement Remote Procedure call under Client / Server Environment.
11. Code simulating PING and TRACEROUTE commands
12. Implementing of Subnetting

XCI 308- DATA BASE MANAGEMENT SYSTEM LAB

XCI 308	DATA BASE MANAGEMENT SYSTEM LAB	L	T	P	C
		0	0	1	1
C:P:A	0:1:1	L	T	P	H
		0	0	1	2

	Course Outcomes:	Domain	Type
CO1	Analyze the organization and identify the entities, attributes and relationships in it. .***Practice*** *the basic* Operations	Cognitive	Remember Knowledge
CO2	***Understand*** and apply cardinalities for each relationship. Identify strong entities and weak entities	Cognitive	Remember Understand Apply
CO3	Installation of MySQL, ***Analyze and Apply*** proper Relational data base queries	Cognitive	Knowledge Apply
CO4	***Apply*** frequency charts for large data sets	Cognitive	Understand Apply
CO5	***Apply*** statistical package to perform factor analysis and tests of significanc	Cognitive	Understand Apply

1. E-R Model Analyze the organization and identify the entities, attributes and relationships in it. Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.
2. Concept design with E-R Model. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).
3. Relational Model : Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion.
4. Normalization : Apply the First, Second and Third Normalization levels on the database designed for the organization
5. Installation of MySQL and practicing DDL commands
6. Installation of MySql. Creating databases, how to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.
7. Practicing DML commands on the Database created for the example organization
8. DML commands are used to for managing data within schema objects. Some examples: retrieve data from a database , insert data into a table , updates existing data within a table, deletes all records from a table, the space for the records remain
9. Practice queries (along with sub queries) involving ANY, ALL, IN, and NOT Constraints etc.
10. Practice queries using Aggregate functions (COUNT, SUM, AVG..etc.,)

	LECTURE	PRACTICAL	TOTAL
	0	60	60

XCI307	AUILLARY PHYSICS LABORATORY	L	T	P	C
		0	0	1	1
C:P:A	0.5:1:0.5	L	T	P	H
PREREQUISITE	Nil	0	0	2	2

COURSE OUTCOMES On the successful completion of this course students would able to		Domain	Level
CO1	***Explain*** gates and ***demonstrate*** functions of various gate with truth table.	Psychomotor: Affective:	Analyze, Mechanism Respond
CO2	***Construct*** the regulator power supply and***Measure*** the output voltage for changing input.	Cognitive Psychomotor	Evaluate
CO3	***Recall*** diodes, ***explain*** circuits and its characteristics	Psychomotor: Affective:	Analyze, Mechanism
CO4	***Construct*** simple circuits using logic gates.	Cognitive Psychomotor	Synthesis
CO5	***Know*** the concepts of semiconductor storage and function of flipflops.	Cognitive Psychomotor	Comprehensio n

Ex. No	Experiments (Any Eight Experiments)	
1.	Basic Logic gates IC's verification.	CO1
2.	Logic gates (AND, OR, NOT) – using discrete components	CO1
3.	Verification of De Morgan's theorem.	CO4
4.	Diode characteristics	CO3
5.	Voltage regulator power supply using full wave rectifier	CO2
6.	Half adder & Half subtractor using basic gate.	CO4
7.	NAND & NOR as Universal Logic gates.	CO1
8.	Full adder using basic gate.	CO3
9.	RS – Flip Flop	CO5
10.	JK – Flip Flop	CO5

	LECTURE	PRACTICAL	TOTAL
HOURS	0	30	30

COURSE OUTCOMES:

CO1: Cog: Ana; Aff: Rec.; Psy: Mech; ***Use*** laboratory techniques such as accuracy of **measurements** and data **analysis**.
CO2: Cog: U; Aff: Rec.; Psy: Set, GR; ***Explain theconcepts*** that are learnt in the lecture sessions and ***follow*** hands-on learning experience in the laboratory sessions.
CO3: Cog: R; Aff: Rec.; Psy: Mech; Gain ***knowledge*** in the scientific methods and ***identify*** the process of **measuring** different Physical variables
CO4: Cog: Ap; Aff: Rec, Org; Psy: Mech; ***Manipulate***and ***complete*** all the experiments with excellent ***application*** knowledge.

Mapping with Programme Outcomes

COs	PO_1	PO_2	PO_3	PO_4	PO_5	PO_6	PO_7	PO_8
CO_1	3	1		2	1	2	3	3
CO_2	3	1		2	1	2	3	2
CO_3	3	1		1	1	2	2	1
CO_4	3	1		2	1	2	3	2
	12	4		7	4	6	11	8
Scaled to 1, 2, 3	**3**	**1**		**2**	**1**	**2**	**3**	**2**

3 – Strong: 2 – Medium: 1 – Low

XUMA003			**DISASTER MANAGEMENT**	**L**	**T**	**P**	**SS**	**C**
				0	**0**	**0**	**0**	**0**
C	P	A		**L**	**T**	**P**	**SS**	**H**
2.75	0	0.25		**3**	**0**	**0**	**0**	**3**

PREREQUISTE: XES202

Course Outcomes		Domain	Level
CO1	***Understand*** and ***Recognize*** the concepts of disaster	Cognitive	Understand Remember
CO2	***Recognize and describe*** the causes and effects of disaster	Cognitive	Understand Remember
CO3	***Describe*** the various approaches of risk reduction	Cognitive	Remember
CO4	***Demonstrate*** the inter-relationship between disaster and development	Cognitive	Understand
CO5	Discuss hazard and vulnerability profile of India and respond to drills related to relief	Cognitive Affective	Remember Response

UNIT - I	**INTRODUCTION TO DISASTERS**	**6**
Concepts and definitions- Disaster, Hazard, Vulnerability, Resilience, Risks		
UNIT - II	**DISASTERS: CLASSIFICATION, CAUSES, IMPACTS**	**12**
Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters, urban disasters, pandemics, complex emergencies, Climate change		
UNIT - III	**APPROACHES TO DISASTER RISK REDUCTION**	**10**
Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.		
UNIT - IV	**INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT**	**6**
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources		
UNIT - V	**DISASTER RISK MANAGEMENT IN INDIA**	**11**
Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation). The project / fieldwork to understand vulnerabilities work on reduction of disaster risk		

and build a cultural safety.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	0	0	0	45

TEXT BOOKS:

1. Coppola P Damon, "Introduction to International Disaster Management, Butterworth-Heinemann, 2015
2. K. N. Shastri, "Disaster Management in India", Pinnacle Technology, 2012
3. Gupta Anil K, Sreeja S. Nair, "Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Lee Allyn Davis, "Natural Disasters", Infobase Publishing, 2010
5. Andharia J, "Vulnerability in Disaster Discourse", JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008

REFERENCES:

1. Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000
2. Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.

E- RESOURCES:

1. NIDM Publications at http://nidm.gov.in- Official Website of National Institute of Disaster Management (NIDM), Ministry of Home Affairs,
2. http://cwc.gov.in , http://ekdrm.net , http://www.emdat.be ,
3. http://www.nws.noaa.gov , http://pubs.usgs.gov , http://nidm.gov.ini
4. http://www.imd.gov.in

XCI403 - OPERATING SYSTEMS

XCI403			OPERATING SYSTEMS	L	T	P	SS	C
				3	0	0	**0**	**3**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
4	0	0		3	0	0	**0**	**3**

PREREQUISITE			
Course Outcomes		**Domain**	**Level**
	After the completion of the course, students will be able to		
CO1	***Identifying*** the important computer system resources and the role of operating system in their management policies and algorithms.	Cognitive	Remember
CO2	Ability to explain the process scheduling algorithms and Calculate scheduling problems	Cognitive	Understand Apply
CO3	Ability to ***express various***process synchronization issues.	Cognitive	Understand Apply
CO4	Indicate the memory management techniques and importance of file system.	Cognitive	Understand
CO5	*Classify* functionality and have sound knowledge of various types of operating system android.	Cognitive	Understand

UNIT I	**INTRODUCTION TO OPERATING SYSTEM**		**12+3**

What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

UNIT II	**PROCESS CHARACTERIZATION**		**12+3**

Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Pre-emptive and Pre-emptive Scheduling Algorithms.

UNIT III	**INTER PROCESS COMMUNICATION AND SYNCHRONIZATION**		**12+3**

Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery. Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

UNIT IV	**MEMORY MANAGEMENT**		**12+3**

Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory. (File and I/O Management, OS security) Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Security Policy Mechanism, Protection, Authentication and Internal

Access Authorization.			
UNIT V	**INTRODUCTION TO ANDROID OPERATING SYSTEM**		**12+3**
Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System, Small Application Development using Android Development Framework.			

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY		TOTAL
60	**15**	0	**15**		**75**

Text book

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education ,1997.
4. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992

E-References

1. NPTEL Evidence, 2009. *IISc Bangalore*. [Online] Available at:
2. http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html
3. http://nptel.iitg.ernet.in/Comp_Sci_Engg/IISc%20Bangalore/Operating%20Systems.htm

CO Versus PO mapping.

B.Sc CY	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1						2
CO2	2	1	2	2			2		2
CO3	2	2	1				2		3
CO4	2	2	1						
CO5	2	1				1			1
Total	11	8	5	2		1	2		8
Scaled Value	3	2	1	1		1	1		2

0-No relation 1– Low relation 2- Medium relation 3- Highly relation

XCI 404 - INTERNET OF THINGS (IoT)

XCI404			INTERNET OF THINGS (IoT)	L	T	P	SS	C
				2	0	0	0	2
C	P	A		L	T	P	SS	H
2	0	0		2	0	0	1	2

PREREQUISITE: Students with fundamental Knowledge of C & Python language , Semiconductor and fundamentals Digital Electronics

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

Course Outcome		Domain	Level
CO1	***Understand the definition and significance of the Internet of Thing,*** Introduce the fundamental concepts of IoT and physical computing,	**Cognitive**	Knowledge, Analyze
CO2	Discuss the architecture, operation, and including devices for sensing, actuation, processing, and communication	**Cognitive**	Knowledge, Comprehension
CO3	Design a portable IoT using Arduino/ equivalent boards and relevant protocols. Know the basics of operational Arduino IDE Installing and Setting up the Arduino IDE various applications	**Cognitive, Psychomotor**	Knowledge, Analysis, Set
CO4	***Deploy an IoT application and connect Working with Arduino for data acquisition***	**Cognitive**	Knowledge
CO5	***Understand how to Implement application development and tools.***	**Cognitive**	Perception, Knowledge

UNIT - I :	INTRODUCTION INTERNET OF THING	15

Introduction and definition to IoT - What is an IoT? - Explore the scenario for application of IOT Communication definitions Concepts - Characteristics of IoT - Challenges and Issues - Physical Design of IoT, Logical Design of IoT - IoT Functional Blocks, Security

UNIT - II :	TECHNOLOGIES BEHIND IoT	15

Control Units Communication modules Bluetooth Zigbee Wifi GPS- IOT Protocols (IPv6, 6LoWPAN, RPL, CoAP etc), MQTT, , - RFID, Wireless Sensor Networks Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT

UNIT - III :	PROGRAMMING BASICS FOR IOT	15

Programming Fundamentals with C using Arduino IDE - Understanding the Arduino IDE - Installing and Setting up the Arduino IDE - Connecting the Arduino IDE with devices - Program Structure in C - Basic Syntax - Data Types / Variables / Constants - Operators, Conditional Statements and Loops - Strings and I/O -Using Arduino C Library functions for Serial, delay and other invoking functions - Working with LED and Switch example on Arduino C Library functions

UNIT - IV :	WORKING WITH ARDUINO FOR DATA ACQUISITION	15

Working with Arduino for data acquisition with IOT Devices - Understanding Sensors and Devices - Understanding basic electronic components and power elements - Understanding the Inputs from Sensors - Working with Temperature Sensors -Working with Ultrasound Sensor -Working with humidity sensor - Working with Motion Sensor - Working with IR Sensor

UNIT - V :	SENSOR PROGRAMMING	15
Working with Proximity Sensor - Working with Photo Diode - Working with Accelerometer and vibration sensor - Measuring Voltage and Current Working with Arduino for data acquisition with IOT Devices - Understanding the Outputs - Activating LED Lights - Activating Relays - Activating Buzzer - Running DC Motors - Running - Stepper Motors and Servo Motors		

LECTURE	TUTORIAL	SELF - STUDY	PRACTICAL	TOTAL
45	-	-	-	45

REFERENCE BOOKS:

1	Michael Margolis, "Arduino Cookbook" 2nd Edition, O'Reilly Media, 2011
2	Michael Collier, Robin Shahan, "Fundamentals of Azure", Microsoft Press, 2015, ISBN: 978-0-7356-9722-5
3	Rick Rainey, "Azure Web Apps for Developers", Microsoft Press, 2015, ISBN: 978-1-5093-0059-4 4. Microsoft Azure, "Introduction to Microsoft Azure Storage", https://docs.microsoft.com/en-us/azure/storage/common/storage-introduction
4	. CharalamposDoukas , Building Internet of Things with the Arduino, Create space, April 2002
5	Dieter Uckelmann et.al, "Architecting the Internet of Things", Springer, 2011
6	The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	1	2	2	1	1	0	0	1	2
CO2	1	3	1	2	2	0	1	2	2
CO3	0	3	1	2	2	1	1	2	2
CO4	0	3	0	2	2	0	1	2	2
CO5	0	3	2	1	3	1	1	3	2
Average	1	2	1	2	2	1	1	2	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 405 - Cryptography

XCI405			Cryptography	L	T	P	SS	C
				3	1	0	0	4
C	P	A		L	T	P	SS	H
3	1	0		3	1	0	0	4

PREREQUISITE:

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

Course Outcome		Domain	Level
CO1	*Apply cryptographic algorithms for encrypting and decryption for secure data transmission.*	Cognitive Psychomotor	Application Evaluate
CO2	*Understand the importance of Digital signature for secure e-documents exchange.*	Psychomotor	Knowledge Application
CO3	*Understand the program threats and apply good programming practice. build* data dashboards	Cognitive Psychomotor	Knowledge Application
CO4	*Understand* Get the knowledge about the security services available for internet and web applications.	Cognitive	Comprehension
CO5	*Understand data vulnerability.*	Psychomotor Affective	Application SynthesisAnalysis

UNIT - I :	INTRODUCTION TO CRYPTOGRAPHY	15

Introduction to Cryptography, Security Threats, Vulnerability, Active and Passive attacks, Security services and mechanism, Conventional Encryption Model- Classical Cryptography: Dimensions of Cryptography, Classical Cryptographic Techniques.

UNIT - II :	BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY	15

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES). Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management – Diffie-Hellman Key exchange-Elliptic curve cryptosystem.

UNIT - III :	HASH FUNCTIONS AND DIGITAL SIGNATURE	15

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD4&MD5 Message Digest Algorithm – SHA – HMAC – CMAC – Digital signature and authentication protocols – DSS – Elgamal – Schnorr signature.

UNIT - IV :	SECURITY PRACTICE AND SYSTEM SECURITY	15

Authentication applications – Kerberos – X.509 Authentication services – Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls – Firewall designs – SET for E-Commerce Transactions.

UNIT - V :	E-MAIL SECURITY AND CASE STUDY	15

E-mail Security: Security Services for E-mail-attacks possible through E-mail – Establishing keys privacyAuthentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME-Internet Key Exchange Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability

LECTURE	TUTORIAL	SELF – STUDY	PRACTICAL	TOTAL
45	-	-	-	45

REFERENCE BOOKS:

	1. William Stallings, "Cryptography and Network Security: Principles and Practices", 6th Edition, Pearson Education Ltd, 2016. 2. Bart Preneel, Christof Paar, Jan Pelzl, "Understanding Cryptography", Springer-Verlag Berlin Heidelberg, 2010. 3. Atul Kahate, "Cryptography and Network Security", Mc Graw Hill, 3rd Edition, 2011. 4. Behrouz A.Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", Tata McGraw Hill Second Edition, 2010. 6. Wenbo Mao, "Modern Cryptography: Theory and Practice", Prentice Hall PTR, 1st Edition, 2003. 7. Douglas R. Stinson , "Cryptography: Theory and Practice", CRC press, 3rd Edition, 2005
	E-REFERENCES:
	The Elements of Statistical Learning: Data Mining, Inference and Prediction, Trevor Hastie, Robert Tibshirani, Jerome Friedman

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	1	2	2	1	1	0	0	1	2
CO2	1	3	1	2	2	0	1	2	2
CO3	0	3	1	2	2	1	1	2	2
CO4	0	3	0	2	2	0	1	2	2
CO5	0	3	2	1	3	1	1	3	2
Average	1	2	1	2	2	1	1	2	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 406- CYBER LAW

XCI406			CYBER LAW	L	T	P	C
				3	1	0	4
C	P	A		L	T	P	H
2.8	0	0.2		3	1	0	4

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	*Define and describe the nature and scope of cybercrime*	Cognitive Psychomotor	Remember Guided
CO2	*To introduce the cyber world and cyber law in general.*	Cognitive	Understand
CO3	*Develop knowledge of major incidents of cybercrime and their resulting impact.*	Cognitive Psychomotor	Understand Response
CO4	*Analyze and discuss national and global digital law enforcement efforts.*	Cognitive Psychomotor	Remember Set
CO5	*Critically consider specific laws and policies governing cybercrime detection and prosecution.*	Cognitive Psychomotor	Analyze Origination

UNIT I	Introduction	12+3
Introduction to cyber space -UNCITRAL Model Law - Information Technology Act, 2000 with recent amendments - Jurisdictional issues - Digital signatures - regulation of - certifying authorities - Cyber Regulation Appellate Tribunal – Human Rights Issues.		
UNIT II	**ONLINE CONTRACTS**	**12+3**
Formation of online contracts - E banking transactions, online payment options, online advertising - Electronic and digital signatures - Taxation issues in cyber space- indirect tax, tax evasion, double tax, international tax, permanent establishment - Protection of trade secrets and deceptive trade practices.		
UNIT III	**CYBER CRIMES**	**12+3**
Understanding cybercrimes - Identifying Theft and Frauds - Types of crimes in the internet: Against person, against property, against government - Digital evidence- investigation and adjudication of cybercrimes in India- cyber arbitration, cyber conflict investigation- cyber Terrorism.		
UNIT IV	**INTELLECTUAL PROPERTY RIGHTS (IPR) AND CYBER SPACE**	**12+3**
Copyright issues in the internet- protection of computer software, caching, international regime-OSS, DMCA, Data Protection Directive - Trademark issues in the internet – Domain Name Registration, Domain Name Registration, Domain Name Dispute, ICANN, UDRP policy, linking, framing, tagging - Database issues in the internet.		
UNIT V	**THE INDIAN EVIDENCE ACT OF 1872 V. INFORMATION TECHNOLOGY ACT, 2000**	**12+3**
Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages.		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
60	30	0	0	90

TEXT BOOKS:

1. BehrouzA.Forouzan, "Data Communications and Networking", Fifth Edition, McGraw Hill Education, 2013.

REFERENCES:

1. 1. Karnika Seth, " Computers, Internet and New Technology Laws" ,Cyber Lawyer and Expert and is The Managing Partner of Seth Associates, Edition

2012.
2. S.K.Verma, Raman mittal , "Legal dimensions of cyber space" ,Indian Law Institute, New Delhi: Indian Institute,2004.
3. Law Relating to Computers Internet & E-commerce – "A Guide to Cyber laws & the Information Technology Act, Rules, Regulations and Notifications along with Latest Case Laws", 2012.
4. Jeff Kosseff , "Cyber security Law", Wiley Publications, 2017.
5. Ian. J. Lyod , "Information technology law" , Information Technology Act 2000, its amendment and IT Rules, 2014.
6. Yee fen Lim , "Cyber space law commentaries and Materials", second edition, Galexia Consulting Pty Ltd, Australia.

E-REFERENCES

1. Video Lecture Link: http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html
2. Lecture Slides, Multiple Choice Questions, Animations Link: http://highered.mheducation.com/sites/0072967757/student_view0/index.html
3. Lecture Slides: http://www.mhhe.com/engcs/compsci/forouzan/

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	0	1	**0**	1	1
CO2	0	1	3	2	0	2	**0**	2	2
CO3	1	2	3	0	0	2	**0**	2	2
CO4	1	2	3	1	0	2	**0**	1	2
CO5	0	3	0	1	0	2	**0**	1	2
Average	1	2	2	1	0	2	**0**	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 407- INTERNET OF THINGS (IoT) LAB

XCI407	INTERNET OF THINGS (IoT) LAB	L	T	P	C
		0	0	1	1
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	1	2

Course Outcomes		Domain	Level
CO1	Understand functionalities of various single board embedded platforms fundamentals. Describe fundamentals of IoT board, system & user defined functions and arrays	Cognitive	Remembering Comprehension
CO2	***Build*** an application program using basic elements of arduino, i/o functions and interrupts working with LED and buttons	Cognitive Psychomotor	Synthesis Evaluation Application
CO3	Describing the use or pin connections in developer boards (such as Raspberry Pi and Arduino UNO), and identifying the pin functions, serial interface pins, power pins and hat pins.	Cognitive Psychomotor	Remembering Comprehension Application
CO4	***Develop*** an application program using analog & digital communication with arduino and UART.	Cognitive	Application Evaluation Synthesis
CO5	Design IoT applications in different domain and be able to analyze and evaluate the data received through sensors in IoT.	Cognitive	Remembering Evaluation Application

60

1. Write a Internet of Things with Arduino program using LED & resistor Blinking LED.
2. Know the functioning Program detect vibration, vibration or tilt of any object gives output .
3. Design and Develop the Arduino program find the working of a touch sensor is similar to that of a simple switch.
4. Design the system using Arduino Board respectively to generate the ultrasound using Ultrasonic Sensor find duration and distance.
5. Apply the Arduino program using smoke sensor has a built-in potentiometer that allows you to adjust the sensor sensitivity according to how accurate you want to detect gas.
6. Measure the temperature using sensor, which is designed specifically to measure the hotness or coldness of an object.
7. Measure the soil moisture using sensor to find Measure the Volumetric content of water.
8. Develop the Arduino program using IR sensor remote, measure the heat of an object as well as detects the motion.
9. Create an Arduino program using PIR sensor detects a human being moving around.
10. Develop a system to control the Arduino program using DC motor, the rotor is a permanent magnet.

Table 1: Mapping COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	2	2	1	1	1	1	1	2	2
CO 2	2	2	1	1	1	1	1	2	2
CO 3	2	1	2	1	2	1	2	2	2
CO 4	2	2	1	2	1	2	1	2	2
CO 5	1	2	1	1	2	1	1	2	2
Total	09	09	06	06	07	06	06	10	10
Course	3	3	2	1	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

1-5 → 1, 6 -10 → 2, 11 -15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 408 - CRYPTOGRAPHY LAB

XCI 408	CRYPTOGRAPHY LAB	L	T	P	C
		0	0	1	1
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	1	2

Course Outcomes		Domain	Level
CO1	*Collect* and *scrap* data from various sources and *uild* a dataset	Cognitive Psychomotor	Application Evaluate
CO2	*Define* Data cleaning strategy and *generate* clean data	Psychomotor	Remembering Application
CO3	*Understand* data visualization techniques and *build* data dashboards	Cognitive Psychomotor	Remembering Application
CO4	*Understand* Machine Learning paradigms	Cognitive	Comprehension
CO5	*Build, Deploy and Tune* Machine Learning Models	Psychomotor Affective	Application Synthesis Analysis

60

1. 1. Write a program to implement Linear Congruential Algorithm to generate 5 pseudo random
numbers in C.
2. Write a program to implement Fermat Primality Testing Algorithm in C.
3. Write a program to implement Rabin-Miller Primality Testing Algorithm in C.
4. Write a program to implement the Euclid Algorithm to generate the GCD of an array of 10 integers in C.
5. Write a Java program to perform encryption and decryption using the algorithms:
a) Ceaser Cipher b) Substitution Cipher c) Hill Cipher
6. Write a Java program to perform encryption and decryption using the algorithms:
a) Playfair Cipher b) Vigenere Cipher
7. Write a Java program to implement the DES algorithm logic
8. Write a JAVA program to implement the BlowFish algorithm logic
9. Write a JAVA program to implement the Rijndael algorithm logic.
10. Using Java Cryptography, encrypt the text "Hello world" using BlowFish. Create your own key using Java keytool.
11. Write a Java program to implement RSA Algorithm
12. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

Table 1: Mapping COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2
CO 1	2	2	2	2	1	2	1	2	2
CO 2	3	3	1	3	2	1	1	2	2
CO 3	2	2	2	3	2	3	2	2	2
CO 4	3	2	1	2	2	2	1	3	2
CO 5	1	3	2	1	2	1	1	2	3
Total	11	12	08	11	09	09	06	11	11
Course	3	3	2	3	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

1-5 → 1, 6 -10 → 2, 11 -15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

Course Name			Introduction to Entrepreneurship Development	L	T	P	C
Course Code			XUM004	1	0	0	1
C	P	A		L	T	SS	H
1	0	0		1	0	1	1
Prerequisite			Basic skills like critical thinking, creativity, risk-taking, problem-solving, networking, leadership.				

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

Course Outcomes		Domain	Level
CO1	**Understand** the concept of Entrepreneurship	Cognitive	Understanding
CO2	**Understand** about an Entrepreneur	Cognitive	Understanding
CO3	**Understand** the characteristics of Entrepreneur	Cognitive	Understanding
CO4	**Understand** the ways to acquire skills of Entrepreneur	Cognitive	Understanding
CO5	**Understand**the concept of Intrepreneurship	Cognitive	Understanding

UNIT 1	INTRODUCTION TO ENTREPRENEURSHIP	3+3

Meaning and Concept of Entrepreneurship, History of Entrepreneurship Development, Role of Entrepreneurship in Economic Development, Myths about Entrepreneurs, Agencies in Entrepreneurship Management and Future of Entrepreneurship

UNIT 2	THE ENTREPRENEUR	3+3

Why to become Entrepreneur, Skills/ Traits required for being an Entrepreneur, Creative and Design Thinking, Entrepreneurial Decision Process, Skill Gap Analysis, Role Models, Mentors and Support System, Entrepreneurial Success Stories.

UNIT 3	CHARACTERISTICS OF AN ENTREPRENEUR	3 +3

Introduction - Characteristic Features of Successful Indian Entrepreneurs - Differences between an Entrepreneur and a Manager - Difference between an Entrepreneur and an Intrapreneur - Relationship between the terms Entrepreneur, Entrepreneurial and Entrepreneurship - Difference between a Scientist, Inventor and Entrepreneur - Relationship between Entrepreneur and Enterprise - Difference between Entrepreneur and Enterprise - Difference between a Self-employed person and Entrepreneur - Common Myths on Entrepreneur

UNIT 4	SKILLS FOR AN ENTREPRENEUR	3 + 3

Business Management Skills - Communication and active listening skills - Risk-taking skills – Networking Skills – Critical Thinking Skills – Problem Solving Skills – Creative Thinking Skills – Customer Service Skills – Financial Skills – Leadership Skills – Time Management and Organizational Skills – Technical Skills

UNIT 5	INTRAPRENEURSHIP	3 + 3

What is Intrapreneurship – Understanding Intrapreneurship – Types of Intrapreneurs – Characteristics of Intrapreneurs – Examples of Intapreneurship

Lecture	15	Self - Study	15	Total	30

Text Book

1. Jayashree Suresh, Entrepreneurial Development, Margham Publications.

References

Essentials of Entrepreneurship and Small Business Management (6th Edition) by Norman M. Scarborough (Paperback - Jan 13, 2010)

2. Entrepreneurship and Small Business Management, Student Edition by Glencoe McGraw-Hill (Hardcover - Feb 24, 2005)

3. Vasant Desai, Dynamics of Entrepreneurship Development, Star Publication, New Delhi.

E-References

1. https://in.indeed.com/career-advice/career-development/entrepreneur-skills
2. https://www.investopedia.com/terms/i/intrapreneurship.asp

COs vs POs

	PO 1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9
CO 1	2	1					1	2	1
CO 2	2	1							1
CO 3	2	1					1		1
CO 4	2	2							1
CO 5	2	2							1
TOTAL	10	7	0	0	0	0	2	2	5
SCALED VALUE	2	2	0	0	0	0	1	1	1

0 - No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation

1-5 →1, 6-10 →2, 11-15 →3

XCI 501A .NET TECHNOLOGIES

XCI503A			DOT NET TECHNOLOGIES	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
2.8	1	0.2		3	2	0	0	8

PREREQUISITE: Nil

COURSE OUTCOMES:

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** the basics of .net frame work	Cognitive Psychomotor	Remember Perception
CO2	***Express*** and ***relate*** decision and iteration control structures to implement programs	Cognitive Psychomotor	Understand Perception
CO3	***Predict*** and ***Create*** database connection and ***manipulate*** the data source	Cognitive Psychomotor	Understand Response
CO4	***Choose*** and ***Apply*** controls and ***reproduce*** well-structured .NET applications	Cognitive Psychomotor	Remember Response
CO5	***Construct*** and ***demonstrate*** various real-world applications in ASP.NET with C#	Cognitive Psychomotor	Create Mechanism

UNIT I	**INTRODUCTION TO .NET FRAMEWORK**	**9**

Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation – Automatic Memory Management- Visual Studio .NET – Using the .NET Framework- The Framework Class Library- .NET objects – ASP .NET - .NET web services – Windows Forms

UNIT II	**INTRODUCTION TO C#.NET**	**9**

Variables and constants – data types – declaration. Operators – types – precedence. Expressions. Program flow – Decision statements – Loop statements – Value data types – Structures, Enumerations. Reference data types- Single dimensional – Multi-dimensional arrays – jagged arrays – dynamic arrays Windows programming– creating windows Forms – windows controls –Events. Menus and Dialog Boxes– Creating menus – menu items – context menu – Using dialog boxes – showDialog () method.

UNIT III	**APPLICATION DEVELOPMENT USING ADO .NET**	**9**

Architecture of ADO.NET – ADO.NET providers – Connection – Command – Data Adapter – Dataset. Accessing Data with ADO.NET **-** Connecting to Data Source, Accessing Data with Data set and Data Reader - Create an ADO.NET application - Using Stored Procedures.

UNIT IV	**INTRODUCTION TO ASP.NET**	**9**

ASP.NET Features**:** Change the Home Directory in IIS - Add a Virtual Directory in IIS Set a Default Document for IIS - Change Log File Properties for IIS - Stop, Start, or Pause a Web Site. Web Controls - HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications - Adding web controls to a Page. Server Controls - Types of Server Controls - Adding ASP.NET Code to a Page.

UNIT V	**APPLICATIONS OF ASP.NET WITH C#**	**9**

Windows Application: Creation of Media Player. Web Applications: Job Portal, E-mail and SMS Server, Online food ordering System.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	0	0	0	45

TEXTBOOKS

1. David Chappell, "Understanding .NET", 2nd Edition, Addison-Wesley Professional, 2006.
2. Andrew Troelsen, PhilJapikse , "Pro C# 7 With .NET and .NET Core", Apress, 2017.
3. Matthew Macdonald, "ASP.NET: The Complete Reference", McGraw Hill Education, 2017.

1. **REFERENCES**

1. Herbert Schildt, "C# 4.0 The Complete Reference", McGraw-Hill Education, 2010.
1. Marino Posadas, "Mastering C# and .NET Framework", Packt Publishing, 2016.
2. 3. Paul Deitel and Harvey Deitel, "Visual C# How to Program", Prentice Hall; Pearson Education Limited; 6th edition (2017).

3. **E-REFERENCES**

1. www.tutorialspoint.com
2. www.microsoft.com/net
3. www.w3schools.com/aspnet

COs versus POs mapping

B.Sc CY	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3				1		1		
CO2	2	2	1	2	3	0	2	1	
CO3	2	3	2	2	3	1	2	2	
CO4	2	3	2	2	3	0	2	2	3
CO5	1	3	3	2	3	1	2	3	2
Total	10	11	8	10	13	2	9	8	5
Scaled Value	2	3	2	2	3	1	2	2	1

1-5 à 1, 6 -10 à 2, 11 -15 à 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 501B- PROGRAMMING IN JAVA

XCI 501B			PROGRAMMING IN JAVA	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
3.5	0.5	0		3	0	0	0	3

PREREQUISITE: Computer Fundamentals

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize***and ***Express*** the fundamentals of Data Base Management System and Relational database system	Cognitive	Remember Understand
CO2	***Recognize*** and ***Explain*** the Transaction Management and Storage implementation techniques	Cognitive	Remember Understand
CO3	***Sketch and show*** the Relational data base design for the real time application.	Cognitive Psychomotor	Apply Set
CO4	***Analyze and Apply*** proper Relational data base queries	Cognitive	Analyze Apply
CO5	***Design and Construct*** an application with suitable form design and data base	Psychomotor	Origination

UNIT I	INTRODUCTION	9+6
Fundamentals of Object-Oriented Programming – Java Evolution – Overview of Java Language – Constants, Variables and Data Types – Operators and Expressions – Decision Making and Branching – Decision Making and Looping		
UNIT II	**CLASSES, OBJECTS AND METHODS**	**9+6**
Introduction – Defining a Class – Adding Variables – Adding Methods – Creating Objects – Accessing Class Members – Constructors – Method Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Final Variables and Methods – Final Classes – Finalizer Methods – Abstract Methods and Classes – Visibility Control		
UNIT III	**ARRAYS, INTERFACE AND PACKAGES**	**9+6**
Arrays - One-Dimensional Array – Creating an array – Two-Dimensional Array – Strings – Vectors – Wrapper Classes – Interfaces: Multiple Inheritance – Packages		
UNIT IV	**MULTITHREADED PROGRAMMING**	**9+6**
Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods – Thread Exceptions – Thread Priority – Synchronization – Implementing the 'Runnable' Interface – Managing Errors and Exceptions – Types of Errors – Exceptions – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions		
UNIT V	**APPLET PROGRAMMING**	**9+6**
Introduction – Applet Life Cycle – Creating an Executable Applet – Designing a Web Page – Applet Tag – Adding Applet to HTML File – Running the Applet – Passing Parameters to Applets – Getting Input from the User - Abstract Windowing Toolkit		

LECTURE	TUTORIAL	PRACTICAL	SSSS SELF-STUDY	TOTAL
45	-	30	-	75

REFERENCES:

1. Bruce Eckel, Thinking in Java (4thedition) Herbert Schildt,
2. Java: The Complete Reference (9thedition)
3. Y. Daniel Liang, Introduction to Java Programming (10thedition)
4. Paul Deitel, Harvey Deitel, Java: How To Program (10thedition)
5. Cay S. Horsttnann, Core Java Volume I –Fundamentals (10thedition)

XCI 501C- OPEN SOURCE SOFTWARE

XCI 501C			OPEN SOURCE SOFTWARE (PHP/MySQL))	L	T	P	C
				3	0	0	3
C	P	A		L	T	P	H
2.8	0	0.2		3	0	0	3

PREREQUISITE: Operating Systems, Programming in C

OBJECTIVE:

- Realize the importance of learning Open Source Software
- Understand the concepts in OSS
- Apply the knowledge in real time applications

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Recognize*** the terminologies and licensing factors of Open Source Software	Cognitive	Remember
CO2	***Express*** the significance of Open Source Software	Cognitive	Understand
CO3	***Employ*** the understanding of Open Source Software and actively ***participate*** in teams for the development of open source software projects	Cognitive Affective	Apply Respond
CO4	***Utilize*** the open source tools effectively in the real world applications.	Cognitive	Apply
CO5	***Design*** the Open Source Web applications	Cognitive	Create

UNIT I	INTRODUCTION TO OPEN SOURCE LICENSING	9

The need of open Sources, advantages of Open sources application, Open Source Development Model Licences and Patents, FOSS, BSD, Free Software Movement, commercial software vs. Open Source software Commercial aspects of Open Source movement - Certification courses issues -global and Indian. Copyrights and copy lefts, Application of Open Sources.Problems with traditional commercial software

Unit II	Open source scripting Language	9

What is PHP? - Basic Syntax of PHP – programming in web environment - Common PHP Script Elements - Using Variables - Constants – Data types - Operators ; Statements – Working With Arrays - Using Functions.

UNIT III	PHP File Handling	9

Creating Functions - Reading Data in Web Pages - PHP Browser - Handling Power, OOP - String Manipulation and Regular Expression , File and Directory Handling , Working With Forms, Introduction to advanced PHP concepts Object-Oriented Programming – Advanced Object-Oriented Programming .

UNIT IV	CSS and Ajax	9

Ajax – Advanced Ajax – Drawing Images on the Server.

UNIT V	Open source database management System: MySQL	9

Introduction– Setting up an account - Starting, Terminating and writing your own MySQL Programs - Record Selection Technology - Working with Strings - Date and Time – Sorting Query Results module - Generating Summary - Working with Metadata – Using

Sequences – MySQL and Web PHP and SQL database: PHP and LDAP ; PHP Connectivity ; Sending and receiving emails , PHP Database Connectivity: Retrieving data from MySQL - Manipulating data in MySQL using PHP			
LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
45	**0**	**0**	**45**

TEXT BOOKS:

1 "Understanding Open Source and Free Software Licensing" By Andrew M. St. Laurent - O'Reilly Media Publications

2. The PHP Complete Reference, Steven Holzner, McGraw Hill Education, 2007

REFERENCES:

1."Open Source Licensing" By Lawrence Rosen, Prentice Hall Publications

2."Linux System Programming" By Robert Love, O'Reilly Media Publications

E-REFERENCES:

1.http://git-scm.com/

2.http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/

3.http://www.gnu.org/philosophy/

4.https://www.gnu.org/software/gawk/manual/

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	0	1	**0**	1	1
CO2	0	1	3	2	0	2	**0**	2	2
CO3	1	2	3	0	0	2	**0**	2	2
CO4	1	2	3	1	0	2	**0**	1	2
CO5	0	3	0	1	0	2	**0**	1	2
Average	1	2	2	1	0	2	**0**	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 502A- Cyber Threat & Model

XCI502A			Cyber Threat & Model	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
2.5	0	0.5		3	0	0	0	3
Pre-Requisites			Linear algebra					

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
CO1	*To gain the knowledge of the cyber threats like email threats, web threats and how to modeling.*	Cognitive	Remember
CO2	*Understand the concept of cyber security threat management.*	Cognitive	Understand
CO3	*Gain experience of security elements and threat analysis.*	Cognitive	Apply
CO4	*To understand the concept of threat models.*	Cognitive	Understand
CO5	*To analyze the Email and Internet use policies.*	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**12+3+3**

Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Cybercrimes. Network Threats: Active/ Passive – Interference – Interception – Impersonation – Worms –Virus – Spam's – Ad ware - Spy ware – Trojans and covert channels –Backdoors – Bots – IP, Spoofing - ARP spoofing - Session Hijacking - Sabotage- Internal treats Environmental threats - Threats to Server security

UNIT II	**SECURITY TREAT AND MANAGEMENT**	**12+3+3**

Risk Assessment - Forensic Analysis - Security threat correlation –Threat awareness – Vulnerability sources and assessment- Vulnerability assessment tools –Threat identification - Threat Analysis - Threat Modeling - Model for Information Security Planning..

UNIT III	**SECURITY ELEMENTS**	**12+3+3**

Authorization and Authentication - types, policies and techniques – Security certification – Security monitoring and Auditing - Security Requirements Specifications – Security Policies and Procedures – Firewalls – IDS - Log Files - Honey Pots.

UNIT IV	**SECURITY MODELS**	**12+3+3**

Access control, Trusted Computing and multilevel security - Security models - Trusted Systems- Software security issues- Physical and infrastructure security- Human factors – Security awareness - Training - Email and Internet use policies.

UNIT V	**CASE STUDY**	**12+3+3**

Carbank: The Great Bank Robbery - Cyber Security Updates Onboard - Monitoring of Log Files and Alerts – Security analysis of industrial control Systems.

LECTURE	**TUTORIAL**	**PRACTICAL**	**S SELF STUDY**	**TOTAL**
60	**15**	**0**	**15**	**75+15**

TEXT BOOKS

Jocelyn O. Padallan ," Cyber Security" , Arcler Press Publisher ,2019

REFERENCES

Swiderski, Frank and Syndex , "Threat Modeling", Microsoft Press,2004.

William Stallings and Lawrie Brown, " Computer Security: Principles and Practice, Prentice Hall", 2008.
Thomas Calabres and Tom Calabrese, "Information Security Intelligence: Cryptographic Principles & Application",, Thomson Delmar Learning Publication, 2004.

E-REFERENCES

https://www.imperva.com/learn/application-security/cyber-security-threats/
https://reciprocity.com/resources/what-are-cybersecurity-threats/

Table 1: Mapping of Cos with POs.

B.Sc CY	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	2	2	2	2	2	1	2	1
CO2	2	3		2	2		3	2	
CO3	3		2	1		2	2		
CO4	2	1	2	3	1			2	1
CO5	2	1	1	3		3	1	2	
Total	11	7	7	11	5	5	7	8	2
Scaled Value	3	2	2	3	1	1	2	2	1

1 -- 5 →1, 6 -- 10 → 2, 11--15 →3

0–No relation 1–Low relation 2–Medium relation 3–Strong relation

XCI 502B- Biometric Security

XCI 502B			Biometric Security	L	T	P	C
				3	0	0	3
C	P	A		L	T	P	H
2.8	0	0.2		3	0	0	3

PREREQUISITE: Operating Systems, Cryptography

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	Identify the key biometric standards and process.	Cognitive	Remember
CO2	Understand and analyze biometric systems at the component level.	Cognitive	Understand
CO3	To be able to analyze and design basic biometric system applications.	Cognitive Affective	Apply Respond
CO4	***Identify the sociological and acceptance issues associated with the design and implementation of biometric systems.***	Cognitive	Understand
CO5	***Develop simple applications for privacy.***	Cognitive	Apply

UNIT I	INTRODUCTION	9

Biometrics– Introduction- benefits of biometrics over traditional authentication systems –benefits of biometrics in identification systems–selecting a biometric for a system– Applications – Key biometric terms and processes – biometric matching methods – Accuracy in biometric systems.

UNIT II	PHYSIOLOGICAL BIOMETRIC TECHNOLOGIES	9

Fingerprints – Technical description –characteristics – Competing technologies – strengths –weaknesses – deployment – Facial scan – Technical description – characteristics – weaknesses–deployment – Iris scan – Technical description – characteristics – strengths – weaknesses – deployment – Retina vascular pattern.

UNIT III	BEHAVIORAL BIOMETRIC TECHNOLOGIES	9

Technical description – characteristics – strengths – weaknesses –deployment – Hand scan – Technical description–characteristics – strengths – weaknesses deployment – DNA biometrics. Behavioral Biometric Technologies: Handprint Biometrics – DNA Biometrics

UNIT IV	FEATURE EXTRACTION	9

Signature and handwriting technology – Technical description –classification – keyboard / keystroke dynamics – Voice – data acquisition – feature extraction – characteristics – strengths –weaknesses– deployment.

UNIT V	MULTI BIOMETRICS & CASE STUDY	9

Multi biometrics and multi factor biometrics – two–factor authentication with passwords – tickets and tokens – executive decision – implementation plan. Case study: Biometrics for banking security – Biometric for Education – implementation of multi biometrics system.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	0	0	45

TEXT BOOKS:

1. Samir Nanavathi, Michel Thieme, and Raj Nanavathi: "Biometrics –Identity verification in a network", 1st Edition, Wiley Eastern, 2002.
2. Khalid saeed with Marcin Adamski, Tapalina Bhattasali, Mohammed K. Nammous, Piotr panasiuk, mariusz Rybnik and soharab H.Sgaikh, —New Directions in Behavioral Biometrics, CRC Press 2017.

REFERENCES:

John Chirillo and Scott Blaul: "Implementing Biometric Security", 1st Edition, Wiley Eastern Publication, 2005.
James wayman,Anil k.Jain,Arun A.Ross,Karthik Nandakumar, —Introduction to Biometrics, Springer, 2011.
Benjamin Muller, Security, Risk and the Biometric State: Governing Borders and Bodies, 1st Edition, Routledge, 2010.

E-Resources:

https://www.tutorialspoint.com/biometrics/index.htm.
https://www.javatpoint.com/biometrics-tutorial.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	2	2	1	2	2	1	**3**	1	1
CO2	2	2	1	2	2	2	**3**	2	2
CO3	2	2	2	1	2	2	**2**	2	2
CO4	2	2	1	1	3	2	**2**	1	2
CO5	2	3	2	2	1	2	**3**	1	2
Average	2	2	2	2	2	2	**2**	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 502C- Block Chain & Crypto currency

XCI502C			Block Chain & Crypto currency	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
2.5	0.5	0		3	0	0	0	3

PREREQUISITE:

COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
CO1	***Understand that how bitcoin works, when a transaction is created and when it is considered part of the blockchain.***	Cognitive	Remember
CO2	***To interact with a blockchain system by sending and reading transactions.***	Cognitive	Understand
CO3	***To learn about different kinds of forking and explain the Bitcoin's network mechanisms for maintaining and upgrading***	Cognitive	Apply
CO4	***To develop of smart contracts, their technical capabilities, practical applications, limitations and security constraints they operate within***	Cognitive	Apply
CO5	***Expertise various development environments and different approaches and evaluate security, privacy, and efficiency of a given block chain system.***	Cognitive	Create

UNIT I	**INTRODUCTION**	**9**

Data Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, and Zero Knowledge Proof.

UNIT II	**BLOCKCHAIN**	**9**

Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain

UNIT III	**DISTRIBUTED CONSENSUS**	**9**

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

UNIT IV	**CRYPTOCURRENCY**	**9**

History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin Cryptocurrency Regulation: Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy.

UNIT V	**CASE STUDY**	**9**

Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain. Naive Blockchain construction, Memory Hard algorithm – Hashcash implementation, Direct Acyclic Graph, Play with Go-ethereum, Smart Contract

Construction, Toy application using Blockchain, Mining puzzles.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF-STUDY**	**TOTAL**
60	**30**	**0**	**0**	**90**
TEXT BOOKS:				
1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, July, 2016. 2. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reiley, 1st Edition, 2014.				
REFERENCES:				
1. Satoshi Nakamoto, " Bitcoin: A Peer-to-Peer Electronic Cash System", 2008. 2. Dr. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger", Yellow paper, 2014. 3. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, "A survey of attacks on Ethereum smart contracts", 2016.				
E-REFERENCES:				
1. https://www.tutorialspoint.com/blockchain/				

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. (AI)	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	0	1	**0**	1	1
CO2	0	1	3	2	0	2	**0**	2	2
CO3	1	2	3	0	0	2	**0**	2	2
CO4	1	2	3	1	0	2	**0**	1	2
CO5	0	3	0	1	0	2	**0**	1	2
Average	1	2	2	1	0	2	**0**	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCY 502D- FIREWALL AND INTERNET SECURITY

XCY502D			FIREWALL AND INTERNET SECURITY	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
2.5	0.5	0		3	0	0	0	3

PREREQUISITE:

COURSE OUTCOMES		DOMAIN	LEVEL
To introduce the concepts of neural networks and fuzzy systems To explain the basic mathematical elements of the theory of fuzzy sets.			
CO1	***To understand the fundamentals of firewalls and internet security***	Cognitive	Remember
CO2	***To differentiate malicious and non-malicious code***	Cognitive	Understand
CO3	***To understand the concept of controls against program threat and to find the vulnerabilities in programs.***	Cognitive	Apply
CO4	***To impart knowledge about file protection mechanism and authentication.***	Cognitive	Apply
CO5	***To understand the concept of Intrusion detection systems and virtual private networks.***	Cognitive	Understand

UNIT I	FIREWALLS AND SECURITY MECHANISM	**9**
Introduction – Types of Firewalls – Packet filters – Application gate ways – Limitations of firewalls - Internet Security - Email security – PGP - S/MIME - IP security – Overview – IP Security Architecture - Web security - SSL, TLS, SET		
UNIT II	PROGRAM SECURITY	**9**
Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Top 10 Flaws – Common Weakness Enumeration Top 25 Most Dangerous Software Errors		
UNIT III	OPERATING SYSTEM SECURITY	**9**
Protected objects and methods of protection- Memory address protection- Control of access to general objects- File protection mechanism-Authentication: Authentication basics- Password- Challenge response- Biometrics.		
UNIT IV	SECURITY IN DATABASES	**9**
Security requirements of database systems – Reliability and Integrity in databases – Two Phase Update – Redundancy/Internal Consistency – Recovery – Concurrency/Consistency – Monitors – Sensitive Data – Types of disclosures – Inference.		
UNIT V	SECURITY IN NETWORKS AND CASE STUDY	**9**
Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL – IPSec –Content Integrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security – Firewalls – Intrusion Detection Systems – Secure e-mail.		

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
60	30	0	0	90

TEXT BOOKS:

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007. 2. Matt Bishop, "Computer Security: Art and Science", Pearson Education, 2003. 3. William Stallings, "Cryptography and Network Security: Principles and Practices", Fifth Edition, Prentice Hall, 2010.
REFERENCES:
1. Michael Howard, David LeBlanc, John Viega, "24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them", First Edition, Mc Graw Hill Osborne Media, 2009. 2. Kaufman, Perlman, Speciner, "Network Security", Prentice Hall, 2nd Edition, 2003.
E-REFERENCES:
1 https://www.geeksforgeeks.org/introduction-of-firewall-in-computer-network/ **2 https://www.javatpoint.com/firewall**

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
(AI)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	1	3	**1**	1	1
CO2	3	3	2	2	2	3	**1**	2	2
CO3	2	2	3	2	2	2	**1**	2	2
CO4	2	3	2	1	2	3	**2**	1	2
CO5	3	3	2	2	2	2	**2**	1	2
Average	3	3	2	2	2	3	**1**	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 503A- NATURAL LANGUAGE PROCESSING

XCI503A			Natural Language Processing	L	T	P	SS	C
				2	1	0	0	3
C	P	A		L	T	P	SS	H
2.5	0.5	0		2	1	0	0	3

PREREQUISITE:

COURSE OUTCOMES		DOMAIN	LEVEL
To introduce the fundamental concepts and techniques of natural language processing (NLP)			
CO1	Understand the fundamental concepts and techniques of natural language processing (NLP)	Cognitive	Remember
CO2	Understanding of the models and algorithms in the field of NLP	Cognitive	Understand
CO3	***Demonstrate the computational properties of natural languages and the commonly used algorithms for processing linguistic information.***	Cognitive	Apply
CO4	***Understanding semantics and pragmatics of languages for processing***	Cognitive	Apply
CO5	***Analyze the applications of NLP***	Cognitive	Create

UNIT I	**NLP Introduction**	**6+3**
Introduction: application of NLP techniques and key issues- MT grammer checkers-dictation – document generation- NL interfaces- Natural language processing key issues-the different analysis level used for NLP: morpho-lexical-syntactic-semantic-pragmatic-markup(TEI, UNICODE)-finite state automata- Recursive and augmented transition networks- open problems		
UNIT II	**HMMS and Speech Recognition**	**6+3**
Lexical Level :HMMS and Speech Recognition: Speech Recognition Architecture – Overview of HMM – Advanced Methods for decoding – Training a speech Recognizer – Human Speech Recognition		
UNIT III	**Tagging**	**6+3**
Part of Speech Tagging: Rule Based, Stochastic Part-ofSpeech Tagging – Transformation Based Tagging-Context Free Grammars for English – Context Free Rules and Trees – Sentence Level ConstructionsCoordination – Agreement – Grammars and Human Processing		
UNIT IV	**PARSING**	**6+3**
arsing with Context Free Grammars – Top down Parser – Problems with Basic Top Down Parser – Finite State Parsing Methods - Representing Meaning: Computational Desiderata for Representations – Meaning Structure of Language – First Order Predicate Calculus		
UNIT V	**Machine Translation**	**6+3**
Analysis – Attached for a Fragment of English- Integrating Semantic Analysis into the Earley Parser, Robust Semantic Analysis : Dialogue and Machine Translation - Dialogue Acts – Automatic, Plan inferential, Cue based Interpretation of Dialogue Acts		

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL

30	15	0	0	45

TEXT BOOKS:

1. Neuro Fuzzy and Soft computing‖, Jang J.S.R.,Sun C.T and Mizutani E – Pearson education, 2004
2. Fundamentals of Neural Networks‖, LaureneFauseett, Prentice Hall India, New Delhi,1994.

REFERENCES:

1. Fuzzy Logic Engineering Applications‖, Timothy J.Ross, McGrawHill,NewYork,1997.
2. Neural networks,Fuzzy logics,and Genetic algorithms‖, S.Rajasekaran and G.A.VijayalakshmiPai Prentice Hall of India,2003
3 Fuzzy Sets and Fuzzy Logic‖, George J.Klir and Bo Yuan, Prentice Hall Inc., New Jersey,1995
4 Principles of Soft Computing‖ S.N.Sivanandam, S.N.Deepa Wiley India Pvt Ltd

E-REFERENCES:

1 https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
2 https://onlinecourses.swayam2.ac.in/arp19_ap79/preview

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. (AI)	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	1	3	**1**	1	1
CO2	3	3	2	2	2	3	**1**	2	2
CO3	2	2	3	2	2	2	**1**	2	2
CO4	2	3	2	1	2	3	**2**	1	2
CO5	3	3	2	2	2	2	**2**	1	2
Average	3	3	2	2	2	3	**1**	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 503B- Ethical Hacking

XCI503A			Ethical Hacking	L	T	P	SS	C
				2	1	0	0	3
C	P	A		L	T	P	SS	H
2.5	0.5	0		2	1	0	0	3

PREREQUISITE:

	COURSE OUTCOMES	DOMAIN	LEVEL
CO1	To Describe and understand the basics of the ethical hacking	Cognitive	Comprehension
CO2	Able to perform the foot printing and scanning	Cognitive Psychomotor Affective	Application Synthesis
CO3	***Characterize the malware and their attacks and detect and prevent them***	Cognitive Psychomotor Affective	Application Comprehension
CO4	***To understand the basic concepts of sniffers and session hijacking***	Cognitive Psychomotor Affective	Application Evaluation
CO5	***Able to learn Intrusion Detection Systems and physical security***	Cognitive Psychomotor Affective	Synthesis Application

UNIT I	INTRODUCTION TO ETHICAL HACKING	**6+3**

Security Fundamental - Security Testing - Hacker and Cracker – Descriptions - Test Plans-keeping it legal - Ethical and Legality-Technical Foundations of Hacking: The Attacker's Process - The Ethical Hacker's Process- Security and the Stack.

UNIT II	FOOTPRINTING AND SCANNING	**6+3**

Information Gathering - Determining the Network Range - Identifying Active Machines-Finding Open Ports and Access Points - OS Fingerprinting Services - Mapping the Network Attack Surface - Enumeration and System Hacking : Enumeration - System Hacking.

UNIT III	MALWARE THREATS AND SESSION HIJACKING	**6+3**

Viruses and Worms- Trojans - Covert Communication - Keystroke Logging and Spyware – Malware Counter Measures- Sniffers - Session Hijacking - Denial of Service - Distributed Denial of Service.

UNIT IV	WEB SERVER HACKING AND ATTACKS	**6+3**

Web Server Hacking - Web Application Hacking - Database Hacking - Wireless Technologies – Mobile Security and Attacks: Wireless Technologies - Mobile Device Operation and Security – Wireless LANs.

UNIT V	CASE STUDY	**6+3**

Intrusion Detection Systems - Firewalls - Honeypots - Physical Security - Social Engineering – Case Studies: Intrusion detection Real Secure Tripwire Dragon Snort ,Packet sniffing Leave the sniffer running, Passwords in procedures & documents.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
30	15	0	0	45

TEXT BOOKS:
1. Michael Gregg,"Certified Ethical Hacker", Version 10, Third Edition, Pearson IT Certification, 2019.
REFERENCES:
1. Roger Grimes ,"Hacking the Hacker" , 1st Edition, Wiley, 2017. 2. Ankit Fadia, " The Unofficial Guide to Ethical Hacking", Laxmi Publications, 2ns Edition, 2006.
E-REFERENCES:
https://intellipaat.com/blog/cyber-security-vs-ethical-hacking-difference/ **https://www.simplilearn.com/tutorials/cyber-security-tutorial/what-is-ethical-hacking**

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
(AI)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	3	3	1	3	**2**	1	1
CO2	3	3	2	2	2	3	**2**	2	2
CO3	2	2	3	2	2	2	**3**	2	2
CO4	2	3	3	1	2	3	**2**	2	2
CO5	3	3	3	2	2	2	**2**	2	2
Average	3	3	3	2	2	3	**2**	2	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI503C- SENTIMENT ANALYTICS

XCI503C			SENTIMENT ANALYTICS	L	T	P	C
				2	1	0	3
C	P	A		L	T	P	H
2.5	0.5	0		2	1	0	3

PREREQUISITE:

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Identify*** the sentiment analytics application	Cognitive	Remember Understand
CO2	Explain the objective and problem of sentiment analytics	Cognitive	Remember Understand
CO3	Discuss the classification of sentiment analytics	Cognitive	Remember Understand
CO4	Discuss the subjective classification of sentiment analytics	Cognitive	Remember Understand
CO5	Explain the rules of sentiment analytics	Cognitive	Remember Understand

UNIT I	**INTRODUCTION**	**9**

Introduction – Sentiment analysis applications - Sentiment analysis research – Different levels of analysis – sentiment lexicon and its issues – sentiment analytics as mini NLP

UNIT II	The Problem of sentiment analysis	**9**

The Problem of sentiment analysis - definition of opinion – sentiment target – sentiment of target – reason and qualifier for opinion - objective and task of sentiment analytics – different types of opinion – regular and comparative opinion – subjective and fact implies opinion

UNIT III	Document sentiment classification	**9**

Document sentiment classification – supervised sentiment classification – classification using machine learning algorithm - classification using custom core function – unsupervised sentiment classification - classification using sentimental lexicon - sentiment rating prediction

UNIT IV	Sentiment subjective classification	**9**

Subjectivity – sentiment subjective classification – sentence sentiment classification – classification method – emotion classification of sentence

UNIT V	Supervised learning	**9**

Supervised learning – lexicon based approach – pros and cons of the two approaches - rules of sentiment composition- sentiment composition rules - negation and sentiment – rule representation

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	**0**	**0**	**45**

TEXTBOOKS

Sentiment analysis – Mining , sentiment , Opinion and Emotions - Bing –Liu – University of Illinois at Chicago

E-REFERENCES

https://www.nhp.gov.in/blood-donation_pg

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. AI	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	1	2	2	1	1	0	0	1	2
CO2	1	3	1	2	2	0	1	2	2
CO3	0	3	1	2	2	1	1	2	2
CO4	0	3	0	2	2	0	1	2	2
CO5	0	3	2	1	3	1	1	3	2
Average	1	2	1	2	2	1	1	2	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI504A- SYSTEM SECURITY

XCI504A			SYSTEM SECURITY	L	T	P	SS	C
				4	2	0	0	6
C	P	A		L	T	P	SS	H
3	0	0		4	2	0	0	6

PREREQUISITE:

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Understand***computer operating systems, distributed systems, networks and representative applications.	Cognitive	Remember
CO2	***Identify the*** distributed system attacks, defenses against them, and forensics to investigate the aftermath	Cognitive	Remember
CO3	***Analyze***the basics of cryptography, how it has evolved, and some key encryption techniques used today.	Cognitive	Analyze
CO4	***Recognize*** the security policies.	Cognitive	Remember
CO5	***Analyze*** the malicious software and DOS attacks.	Cognitive	Analyze

UNIT I	CRYTOGRAHIC TOOLS	9+6
Cryptographic Tools- Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudorandom Numbers, Practical Application: Encryption of Stored Data		
UNIT II	**USER AUTHENTICATION**	**9+6**
User Authentication- Means of Authentication, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, RemoteUser Authentication, Security Issues for User Authentication, Practical Application: An Iris Biometric System, Case Study: Security Problems for ATM Systems		
UNIT III	**ACCESS CONTROL**	**9+6**
Access Control- Access Control Principles, Subjects, Objects, and Access Rights, Discretionary Access Control, Example: UNIX File Access Control, Role - Based Access Control, Case Study: RBAC System for a Bank		
UNIT IV	**DATABASE SECURITY**	**9+6**
Database Security-The Need for Database Security, Database Management Systems, Relational Databases, Database Access Control, Inference, Statistical Databases, Database Encryption, Cloud Security		
UNIT V	**MALICIOUS SOFTWARE**	**9+6**
Malicious Software-Types of Malicious Software (Malware), Propagation– Infected Content–Viruses, Propagation–Vulnerability Exploit–Worms, Propagation–Social Engineering–SPAM E-mail, Trojans, Payload–System Corruption, Payload–Attack Agent–Zombie, Bots, Payload–Information Theft– Keyloggers, Phishing, Spyware, Payload–Stealthing–Backdoors, Rootkits,, Countermeasures,Denial-of-Service Attacks-		

Denial-of-Service Attacks, Flooding Attacks, Distributed Denial-of-Service Attacks, Application-Based Bandwidth Attacks, Reflector and Amplifier Attacks, Defenses Against Denial -of-Service Attacks, Responding to a Denial-of-Service Attack.				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
30	**15**	**0**	**0**	**45**

TEXTBOOKS:

1. M. Stamp, "Information Security: Principles and Practice," 2 st Edition, Wiley, ISBN: 0470626399, 2011.
2. M. E. Whitman and H. J. Mattord, "Principles of Information Security," 4 st Edition, Course Technology, ISBN: 1111138214, 2011.
3. M. Bishop, "Computer Security: Art and Science," Addison Wesley, ISBN: 0 -201-44099-7, 2002.
4. G. McGraw, "Software Security: Building Security In," Addison Wesley, ISBN: 0321356705, 2006

REFERENCES:

1. David J. Kruglinski, Inside Visual C++, Microsoft Press 1992.
2. Boar, B.H., Implementing Client / Server Computing ; A Strategic Perspectre, Mcraw Hill, 1993.
3. Bouce Elbert, Client / Server Computing, Artech. Press, 1994.
4. Alex Berson, Client / Server Architecture, McGraw Hill, 1996.

E-REFERENCES:

1. fivedots.coe.psu.ac.th/~suthon/csw/01%20-20Client%20Server%20Computing.pdf
2. www.bcanotes.com/Download/DBMS/Rdbms/Client_Server%20Computing.pdf

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	**PO**							**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	1	1	2	1	1	1	1	2	1
CO2	1	2	1	1	1	1	1	2	1
CO3	1	1	2	1	1	1	1	2	1
CO4	1	2	1	1	1	1	1	1	1
CO5	1	1	3	2	1	1	2	1	1
Average	1	1	2	1	1	1	1	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI504B- NETWORK SECURITY

XCI504B			NETWORK SECURITY	L	T	P	SS	C
				3	1	0	0	4
C	P	A		L	T	P	SS	H
3	0	0		3	1	0	0	4

PREREQUISITE:

Course Outcomes		Domain	Level
To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks. To impart knowledge related to the various concepts, methods of Network Security using cryptography basics, program security, database security, and security in networks.			
CO1	Understand computer networks security and representative applications.	Cognitive	Remember
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms	Cognitive	Remember Apply
CO3	Apply the different cryptographic operations of public key cryptography	Cognitive	Analyze, Apply
CO4	Apply the various Authentication schemes to simulate different applications.	Cognitive	Remember Apply
CO5	Understand various Security practices and System security standards	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**9+3**

Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory –cryptosystem – cryptanalysis.

UNIT II	**Symmetric Ciphers**	**9+3**

Overview-Symmetric Ciphers: Classical Encryption Techniques, Block ciphers and the Data Encryption Standards Public key Encryption and Hash Functions: Public-Key Cryptography and RSA

UNIT III	**Public key cryptography**	**9+3**

Mathematics of Asymmetric Key Cryptography: Primes – Primality Testing – Factorization – Euler's totient function, Fermat's and Euler's Theorem ASYMMETRIC KEY CIPHERS: RSA cryptosystem – Key distribution – Key management – Diffie Hellman key exchange.

UNIT IV	**Network Security Practices**	**9+3**

Authentication applications-Electronic Mail Security- IP Security-Web Security

UNIT V	**Network System Security**	**9+3**

System Security: Intruders-Malicious Software-Firewalls -viruses – Network Firewalls.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL

45	15	0	0	60
TEXTBOOKS:				
1. William Stallings, Cryptography and Network Security-Principles and Practices, Prentice-Hall, Third edition, 2003 ISBN: 8178089025				
REFERENCES:				
1. By Joseph Migga Kizza, Guide to Computer Network Security, Springer 2015. 2. Johannes A. Buchaman, Introduction to cryptography, Springer-Verlag 2000. 3. AtulKahate, Cryptography and Network Security, Tata McGraw Hill. 2007				

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	1	2	1	2	2	2	1	2	1
CO2	1	2	1	2	2	1	1	2	1
CO3	2	1	1	2	1	1	1	2	1
CO4	1	2	1	1	1	1	1	1	1
CO5	1	2	2	2	2	2	2	1	1
Average	1	2	1	2	2	1	1	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI504C- ETHICS OF AI

XCI504C			ETHICS OF AI	L	T	P	C
				3	0	0	3
C	P	A		L	T	P	H
3	0	0		3	0	0	3

PREREQUISITE: There are no prerequisites for the course.

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Understand*** the ethical issues in the development of AI agents.	Cognitive	Remember Understand
CO2	***Remember and Understand*** the AI concepts to societal problems by adapting the legal concepts by securing fundamental rights.	Cognitive	Remember Understand
CO3	***Understand*** the ethical policies in AI based applications and Robot development	Cognitive	Remember Understand
CO4	Learn and ***Understand*** the ethical considerations of AI with perspectives on ethical values	Cognitive	Remember Understand
CO5	This study will help to ***Understand*** and overcome the evil genesis in the concepts of AI.	Cognitive	Remember Understand

UNIT I	INTRODUCTION TO ETHICS OF AI	9+3
Role of Artificial Intelligence in Human Life, Understanding Ethics, Why Ethics in AI? Ethical Considerations of AI, Current Initiatives in AI and Ethics, Ethical Issues with our relationship with artificial Entities.		
UNIT II	**FRAMEWORK AND MODELS**	**9+3**
AI Governance by Human-right centered design, Normative models, Role of professional norms, Teaching Machines to be Moral.		
UNIT III	**CONCEPTS AND ISSUES**	**9+3**
Accountability in Computer Systems, Transparency, Responsibility and AI. Race and Gender, AI as a moral right-holder.		
UNIT IV	**PERSPECTIVES AND APPROACHES**	**9+3**
Perspectives on Ethics of AI, Integrating ethical values and economic value, Automating origination, AI a Binary approach, Machine learning values, Artificial Moral Agents.		
UNIT V	**CASES AND APPLICATION**	**9+3**
Ethics of Artificial Intelligence in Transport, Ethical AI in Military, Biomedical research, Patient Care, Public Health, Robot Teaching, Pedagogy, Policy and Smart City Ethics.		

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	15	-	60

REFERENCES

1. Paula Boddington, "Towards a Code of Ethics for Artificial Intelligence", Springer, 2017.
2. Markus D. Dubber, Frank Pasquale, Sunit Das, "The Oxford Handbook of Ethics of AI", Oxford University Press Edited book, 2020.
3. S. Matthew Liao, "Ethics of Artificial Intelligence", Oxford University Press Edited

99 Book, 2020.
4. N. Bostrom and E. Yudkowsky. "The ethics of artificial intelligence". In W. M. Ramsey
and K. Frankish, editors, The Cambridge Handbook of Artificial Intelligence, pages
316–334. Cambridge University Press, Cambridge, 2014.
5. Wallach, W., & Allen, C, "Moral machines: Teaching robots right from wrong", Oxford
University Press, 2008.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	1	1	2	2	2	2	1	2	1
CO2	1	1	2	2	2	1	1	2	2
CO3	2	1	1	2	1	1	1	2	1
CO4	1	2	2	1	1	1	1	1	1
CO5	1	2	2	2	2	2	2	1	1
Average	1	1	2	2	2	1	1	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 505A - Natural Language Processing Lab

XCI 505A	Natural Language Processing Lab	L	T	P	C
		0	0	2	2
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	4	4

Course Outcomes	Domain	Level
To introduce the fundamental concepts and techniques of natural language processing (NLP)		60

1. Preprocessing of text (Tokenization, Filtration, Script Validation, Stop Word Removal, Stemming)
2. Implementing word similarity
3. Implementing simple problems related to word disambiguation
4. Simple demonstration of part of speech tagging.
5. Lexical analyzer.
6. Semantic Analyzer.
7. Sentiment Analysis.

XCY 505B – Ethical Hacking Lab

XCI 505B	Ethical Hacking Lab	L	T	P	C
		0	0	2	2
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	4	4

Course Outcomes	Domain	Level
		60

1-Footprinting-and-Reconnaissance
2-Scanning-Networks fixes and update
3-Enumeration
4-Vulnerability-Analysis
5-System-Hacking
6-Malware
7-Sniffing
8-Social-Engineering
9-Denial-of-Service

XCI 506A - DOT NET TECHNOLOGIES LAB

<table>
<tr><td rowspan="2">XCI 506A</td><td rowspan="2">DOT NET TECHNOLOGIES LAB</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>2</td></tr>
<tr><td rowspan="2">C:P:A</td><td rowspan="2">0:1.5:0.5</td><td>L</td><td>T</td><td>P</td><td>H</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>4</td></tr>
<tr><td colspan="2">Course Outcomes</td><td>Domain</td><td colspan="3">Level</td></tr>
<tr><td colspan="4"></td><td colspan="2">60</td></tr>
<tr><td colspan="6">1.Familiarizing with .NET Environment.
2. Work with Console
3. Looping and Conditional Statements
4. Working with various Controls such as timer, calendar, etc.,
5. Create basic text editor
6. Insert, Delete, Update and Modify Operations
7. Store and retrieve data using Data Grids
8. Working with various Controls
9. Using stored Procedures
10.Form Creation with HTML
11.Real Time Project</td></tr>
</table>

XCI 506B - PROGRAMMING IN JAVA LAB

XCI 506B	PROGRAMMING IN JAVA LAB	L	T	P	C
		0	0	2	2
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	4	4

Course Outcomes	Domain	Level
		60

1. Simple Java Programs
2. Decision Making, Branching and Looping
3. Constructors and Method Overloading
4. Inheritance and Method Overriding
5. Arrays and Strings
6. Interfaces and Packages
7. Multi Threading
8. Exception Handling
9. Applet Programming
10. Event Handling

XCI 506C - OPEN SOURCE SOFTWARE LAB

XCI 506C	OPEN SOURCE SOFTWARE LAB	L	T	P	C
		0	0	2	2
C:P:A	0:1.5:0.5	L	T	P	H
		0	0	4	4
Course Outcomes	Domain	Level			
		60			

1. Write a program to find the factorial of a number.

2. Write a program using Conditional Statements.

3. Write a program to find the maximum value in a given multi dimensional array.

4. Write a program to find the GCD of two numbers using user-defined functions.

5. Design a simple web page to generate multiplication table for a given number.

6. Design a web page that should compute one's age on a given date.

7. Write a program to download a file from the server.

8. Write a program to store the current date and time in a COOKIE and display the 'Last Visited' date and time on the web page.

9. Write a program to store page views count in SESSION, to increment the count on each refresh and to show the count on web page.

10. Design an authentication web page in PHP with MySQL to check username and password.

11 Write a PHP program to access the data stored in a mysql table.

12 . Write a PHP program interface to create a database and to insert a table into it.

i). Write a PHP program using classes to create a table.

ii). Write a PHP program to upload a file to the server.

XCI601A-WEB TECHNOLOGIES

XCI 601A			WEB TECHNOLOGIES	L	T	P	SS	C
				3	0	1	0	4
C	P	A		L	T	P	SS	H
2	1	0		3	0	2	0	5

PREREQUISITE: Software Engineering

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Web Technology.	Cognitive Psychomotor	Remember Perception
CO2	***Express*** the knowledge on HTML, CSS and JavaScript and PHP in Web Design.	Cognitive	Understand
CO3	***Employ*** the understanding of the Client and Server-side scripts and actively ***participate*** in teams for the creation of static and dynamic web pages.	Cognitive Affective	Apply Respond
CO4	***Utilize*** the web designing tools effectively in the real world applications.	Cognitive	Apply
CO5	***Design*** and ***Establish*** the Website or Web based Software.	Cognitive Psychomotor	Create Set

UNIT I	INTRODUCTION TO WEB TECHNOLOGY & HTML	9+6

Introduction to Web Technology – Concept of Tier – Web Pages – Static Web Pages – Dynamic Web Pages – HTML Basics – HTML CSS – Links – Images – Tables – Lists - Frames - HTML forms and Input tags.

UNIT II	CSS & JAVASCRIPT	9+6

CSS Basics – Texts and Fonts – Links, Lists and Tables – Border and Outline – Position – Dimension and Display - Java Script Basics – Functions – Events – Conditional and Looping Statements – Forms.

UNIT III	PHP BASIC CONCEPTS	9+6

PHP - Basic Syntax – Data Types – Variables & Constants in PHP - String and Operators - Selective and Iterative flow of controls - PHP arrays & types - PHP function declaration - adding parameters - Server side includes - Built in functions

UNIT IV	PHP ADVANCED CONCEPTS	9+6

PHP File Handling - Opening a File - Closing a File - Check End-Of-File - Reading a File Line By Line - Reading File Character By Character - PHP File Upload - Exception Handling - Creating Custom Exception Class - Re-Throwing Exceptions - Cookies - Sessions - E-Mails

UNIT V	PHP & MySQL	9+6

MySQL Database – Connect – Create DB – Create Table – Insert Data – Get Last ID – Insert Multiple - Select Data – Delete Data – Update Data – Limit Data PHP with MySQL

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	0	30	-	75

TEXT BOOKS

1. AchyutS.Godbole, AtulKahate, "Web Technologies TCP/IP To Internet Application Architectures", First Edition, Tata McGraw-Hill Publishing Company Limited, 2003.

2. Elizabeth Castro, Bruce Hyslop, "HTML 5 and CSS 3", Eight Edition, Peachpit Press, 2015.
3. Thomas A. Powell, Fritz Schneider, "JavaScript: The Complete Reference", Second Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2008.
4. Kevin Tatroe, Peter MacIntyre and RasmusLerdorf, "Programming PHP", Third Edition, O'Reilly Media, Inc., 2015.

REFERENCES:

1. N.P. Gopalan, J.Akilandeswari, "Web Technology: A Developer's Perspective", Second Edition, PHI Learning Private Limited, 2014.
2. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2010.

E-REFERENCES:

1.www.php.net/manual/en/intro-whatis.php
2.www.w3schools.com
3.www.tutorialspoint.com

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

1-5 → 1, 6 -10 → 2, 11 -15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI601B - MOBILE APPLICATION AND DEVELOPMENT

XCI**601B**			**MOBILE APPLICATION AND DEVELOPMENT**	**L**	**T**	**P**	**SS**	**C**
				3	**0**	**0**	**0**	**3**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0**	**0**		**3**	**0**	**0**	**0**	**3**

PREREQUISITE: Fundamentals of Computer

Course Outcomes		**Domain**	**Level**
After the completion of the course, students will be able to			
CO1	***Recognize*** the significance of Android platform and its architecture	Cognitive	Remember
CO2	***Summarize*** the knowledge on java, xml with android and ***detect*** about the android development.	Cognitive Psychomotor	Understand Perception
CO3	***Manipulate*** and utilize the layout, resources and user interface.	Cognitive Affective	Application Receiving
CO4	To ***know*** about the database in android	Cognitive	Understand
CO5	***Design*** and test the android environment using exception handling, accessing the cloud data.	Cognitive	Create

UNIT I	**INTRODUCTION**	**9**

(Introduction) What is Android, Android Versions and its Feature Set, Various Android Devices on the Market, Android Market Application Store, Android Development Environment System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs).

UNIT II	**ANDROID ARCHITECTURE OVERVIEW AND APPLICATION**	**9**

Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project ,Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files..

UNIT III	**ANDROID SOFTWARE DEVELOPMENT PLATFORM AND FRAMEWORK**	**9**

Understanding Java SE and the Dalvik Virtual Machine, The Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML, Screen Sizes , Launching Mobile Application: The AndroidManifest.xml File, Android Application Components, Android Activities: Defining the UI, Android Service s: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components.

UNIT IV	**UNDERSTANDING ANDROID USER INTERFACES, VIEWS AND LAYOUTS**	**9**

Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical

Layout Tool Displaying Text with TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress with Seek Bar, Working with Menus using views, Gallery, Image Switcher, Grid View, and Image View views to display images, Creating Animation.		
UNIT V	**DATABASES, INTENTS, LOCATION-BASED SERVICES**	**9**
Saving and Loading Files, SQLite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers Intents and Intent Filters: Intent Overview, Implicit Intents, Creating the Implicit Intent Example Project, Explicit Intents, Creating the Explicit Intent Example Application, Intents with Activities, Intents with Broadcast Receivers. Sending SMS Messages Programmatically, Getting Feedback after Sending the Message Sending SMS Messages Using Intent Receiving, sending email, Introduction to location-based service, configuring the Android Emulator for Location -Based Services, Geocoding and Map-Based Activities Multimedia: Audio, Video, Camera: Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures.		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	0	0	-	45

TEXT BOOK		
Android Programming Unleashed (1st Edition) by Harwani. Beginning Mobile Application Development in the Cloud (2011), Richard Rodger		
REFERENCES:		
1. Professional Android 4 Application Development, 3rd edition, reto meier, wiley publication 2012. 2. **Programming Android,** 1st Edition, Zigurd Mednieks, Laird Dornin, G. Blake Meike, Masumi Nakamura, Oreilly publications, 2011.		

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. AI	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	2	1	1	1
CO2	3	2	2	2	2	2	2	2	1
CO3	2	2	2	2	3	2	2	2	1
CO4	3	2	2	2	2	2	2	3	1
CO5	3	3	3	3	3	3	3	3	1
Average	3	2	2	2	2	2	2	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI601C- Cyber Crime investigation and digital forensics

XCI601C			Cyber Crime investigation and digital forensics	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
3	0	0		3	0	0	0	3

PREREQUISITE: Fundamentals of Cyber Security

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Understand the types of cybercrime and fundamentals.***	Cognitive	Remember
CO2	***Describe the types of cybercrime offenses and attacks.***	Cognitive Psychomotor	Understand Perception
CO3	Describe the types of cybercrime offenses and attacks.	Cognitive Affective	Application Receiving
CO4	Demonstrate the Digital Forensics.	Cognitive	Understand
CO5	Design a method to solve a problem in different perspective.	Cognitive	Create

UNIT I	INTRODUCTION TO CYBERCRIME	**9**

Introduction-Classifications of Cybercrimes: E-Mail Spoofing-Spamming-Cyber defamation-Internet Time Theft-Newsgroup Spam-Crimes from Usenet Newsgroup-Industrial Spying-Industrial Espionage-Hacking-OnlineFrauds-PornographicOffenses-SoftwarePiracy-Password Sniffing-Credit Card Frauds and Identity Theft.

UNIT II	CYBER OFFENSES	**9**

Cyber offenses: How Criminals Plan that attack-Categories of Cybercrime, Passive Attack, Active Attacks-Scanning/Scrutinizing gathered Information-Attack on Gaining and Maintaining the System Access-Social Engineering-cyber stalking-Cyber cafe and Cybercrimes. Bottleneck: The Fuel for Cybercrime-Attack Vector and Cloud Computing.

UNIT III	INTRODUCTION TO COMPUTER FORENSICS	**9**

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques – Incident and incident response methodology – Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. – Forensics Technology and Systems – Understanding Computer Investigation – Data Acquisition.

UNIT IV	DIGITAL FORENSICS	**9**

Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools -Forensic Technology and Practices - Forensic Ballistics and Photography - Face, Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics.

UNIT V	LAWS AND CASE STUDY	**9**

Laws and Ethics - Digital Evidence Controls - Evidence Handling Procedures - Basics of Indian Evidence ACT IPC and CrPC - Electronic Communication Privacy ACT - Legal Policies. Case Studies - Cyber Attack on Cosmos Bank- Nasscom Internet fraud- crime using E-Mail in Tamil nadu- call centre fraud- BSNL unauthorized access- SMS fraud- Phishing in people's account-credit card fraud.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL

45	**0**	**0**	**-**	**45**

REFERENCES:

1. Nina Godbole, Sunit Belapur, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Publications, April, 2011.

2. James Graham, Richar Howard,Ryan Olson, "Cyber Security Essentials", CRC Press, Tailor and Francis Group, 2011.

3. Robert Jones, "Internet Forensics: Using Digital Evidence to Solve Computer Crime", O'Reilly Media, October, 2005.

4. Chad Steel, "Windows Forensics: The field guide for conducting corporate computer investigations", Wiley India Publications, December, 2006.

5. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

Web Resources:

1. https://www.cyberralegalservices.com/detail-casestudies.php.
2. ttps://rtinagpur.cag.gov.in/uploads/CaseStudies/CaseStudiesonCyberCrimesNOTSENT/CaseStudies on CyberCrimes.pdf.

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	2	1	1	1
CO2	2	2	2	2	2	2	2	2	1
CO3	2	2	2	2	3	2	2	2	1
CO4	2	2	2	2	2	2	2	3	1
CO5	2	3	3	3	3	3	3	3	1
Average	2	2	2	2	2	2	2	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI602A - HUMAN COMPUTER INTERFACE

XCI602A			HUMAN COMPUTER INTERFACE	L	T	P	SS	C
				4	0	0	2	6
C	P	A		L	T	P	SS	H
3	0	0		4	0	0	2	6

PREREQUISITE: Fundamentals of Computer

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Analyze*** the concepts relating to the design of human - computer interfaces in ways making computer-based systems comprehensive, friendly and usable	Cognitive	Analyze
CO2	Understand the theoretical dimensions of human factors involved in the acceptance of computer interfaces	Cognitive	Evaluate
CO3	Choose the important aspects of implementation of human-computer interfaces	Cognitive	Apply
CO4	Identify the various tools and techniques for interface analysis, design, and evaluation.	Cognitive	Apply
CO5	Identify the impact of usable interfaces in the acceptance and performance utilization of information systems.	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**12**
Introduction: Historical Evolution of HCI, Interactive System Design: Concept of Usability-Definition and Elaboration, HCI and Software Engineering, GUI Design and Aesthetics, Prototyping Techniques		
UNIT II	**MODEL-BASED DESIGN**	**12**
Model-Based Design and Evaluation: Basic Idea, Introduction to Different Types of Models, GOMS Family of Models (KLM And CMN -GOMS), Fitts' Law and Hickhyman's Law.		
UNIT III	**GENERAL DEVELOPMENT**	**12**
General Development Guidelines and Principles: Shneiderman's Eight Golden Rules, Norman's Seven Principles, Norman's Model of Interaction, Nielsen's Ten Heuristics with Example of its use, Contextual Inquiry.		
UNIT IV	**DIALOG DESIGN**	**12**
Dialog Design: Introduction to Formalism in Dialog Design, Design using FSM (Finite State Machines), State Charts and (Classical) Petri Nets in Dialog Design. Task Modeling and Analysis: Hierarchical Task Analysis (HTA), Engineering Task Models and Concur Task Tree (CTT).		
UNIT V	**OBJECT ORIENTED MODELLING**	**12**
Object Oriented Modelling: Object Oriented Principles, Definition of Class and Object and their Interactions, Object Oriented Modelling for User Interface Design, Case Study Related to Mobile Application Development..		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
60	0	0	30	60+30

TEXT BOOK
1. Dix A., Finlay J.,Abowd G. D. and Beale R. Human Computer Interaction, 3 rd edition, Pearson Education, 2005. 2. Preece J., Rogers Y.,Sharp H.,Baniyon D., Holland S. and Carey T. Human Computer 3. Interaction,Addison-Wesley, 1994. 4. B.Shneiderman; Designing the User Interface,Addison Wesley 2000 (Indian Reprint).

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	2	1	1	1
CO2	3	1	1	1	2	2	2	2	1
CO3	2	2	2	2	2	1	1	2	2
CO4	1	2	2	2	2	2	2	3	1
CO5	1	1	2	2	3	3	3	3	1
Average	2	2	2	2	2	2	2	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI602B - WEB MINING & RECOMMENDER SYSTEMS

XCI**602B**			**WEB MINING & RECOMMENDER SYSTEMS**	**L**	**T**	**P**	**SS**	**C**
				3	**0**	**0**	**0**	**3**
C	**P**	**A**		**L**	**T**	**P**	**SS**	**H**
3	**0**	**0**		**3**	**0**	**0**	**0**	**3**

PREREQUISITE: Web Technology

Course Outcomes		**Domain**	**Level**
To give a deep sense of knowledge in understanding the research perspectives used in Web mining and their direct usage in recommender Systems. Become Familiar with the process of how data is extracted in Recommender Systems in day to day life.			
CO1	***Recognize*** the significance of learn various techniques to mine the Web and other information networks,	Cognitive	Remember
CO2	***Summarize*** the knowledge mine Social networks and Social media	Cognitive	Understand
CO3	***Manipulate*** and utilize the layout, resources and user interface.	Cognitive Affective	Application Receiving
CO4	To apply the appropriate technique for data analysis and Understand emerging areas in the ever evolving Web	Cognitive	Understand
CO5	Acquire statistical techniques to analyze complex information and social networks and develop state-of-the-art recommender systems that automate a variety of choice-making strategies	Cognitive	Create

UNIT I	**INTRODUCTION**	**9**
Need, Importance, Applications of Web Data mining. Capturing-users web activities, Client side, middleware vs server side-data and usage logging. Web Mining and its types, Web Usage Mining, Web StructureMining, Web Content Mining		
UNIT II	**WEB USAGE MINING**	**9**
Learning from Browser, Server Logs, Identifying frequent item sets, pattern identification, representing patterns in form of relations/Graphs. Understanding web application or website-Usage, Heat maps. Using statistical tools for usage analysis and machine learning for prospective improvements.		
UNIT III	**WEB STRUCTURE MINING**	**9**
Understanding link structure of the web, Static v/s dynamic linking, representing the link structure as graphs, identifying most / least used links, paths, Categorizing links based on required attributes, Clustering links based on required attributes. Web as a graph, identifying nodes, edges, in-degree, outdegree, HITS Algorithm Page Rank algorithm.		
UNIT IV	**WEB CONTENT MINING**	**9**
Storing web content as text, database, various document types, generating meta-information of web documents, labelling,-tagging, identifying feature sets. Representing web documents, Vector Space Model.TF-IDF, web-page summarization, tokenization, n-gram analysis, Categorizing web pages based on required attributes, Clustering web pages based on required attributes.		
UNIT V	**CONTENT-BASED RECOMMENDATION**	**9**

High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, Discovering features of documents, Obtaining item features from tags, Representing item profiles, Methods for learning user profiles, Similarity based retrieval, Classification algorithms.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	0	0	-	45

REFERENCES BOOK		

1.Bing Liu, Web Data Mining: Exploring Hyperlinks, Content, and Usage Data, 2nd Edition, Springer, 2011

2. SoumenChakrabarti, Mining the Web, Morgan-Kaufmann, first edition, 2002

3.Jannach D., Zanker M. and FelFering A., Recommender Systems: An Introduction, Cambridge University Press(2011), 1sted

Web References:

https://www.kdnuggets.com/2014/09/most-viewed-web-mining-lectures-videolectures.html

https://www.cs.uic.edu/~liub/WebContentMining.html

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. AI	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	2	1	1	1
CO2	3	2	2	2	2	2	2	2	1
CO3	2	2	2	2	3	2	2	2	1
CO4	3	2	2	2	2	2	2	3	1
CO5	3	3	3	3	3	3	3	3	1
Average	3	2	2	2	2	2	2	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI602C - PENETRATION TESTING

XCI602C			PENETRATION TESTING	L	T	P	SS	C
				3	0	0	0	3
C	P	A		L	T	P	SS	H
3	0	0		3	0	0	0	3

PREREQUISITE: Web Technology

Course Outcomes		**Domain**	**Level**
To give a deep sense of knowledge in understanding the research perspectives used in Web mining and their direct usage in recommender Systems. Become Familiar with the process of how data is extracted in Recommender Systems in day to day life.			
CO1	***To Defend against the most common attacks to networks.***	Cognitive	Knowledge Comprehension
CO2	***Estimate the needs and constraints of a given concern's scenario.***	Cognitive	Knowledge Comprehension Evaluation
CO3	***To determine what type of firewall solution, Intrusion detection and Prevention system is appropriate.***	Cognitive Affective	Knowledge Comprehension
CO4	***To Configure Windows and Linux systems for secure operations.***	Psychomotor Affective	Application Synthesis
CO5	***To Formulate an appropriate strategy to defend against virus attacks,Trojan Horses, Spyware, and Adware.***	Psychomotor Affective	Application Synthesis

UNIT I	INTRODUCTION	**9**

Basics of a Network, Network Utilities, OSI Model, TCP/IP, IPv4 Addressing, IPv6Addressing, Assessing Likely Threats to the Network, Classifications of Threats, Likely Attacks, Threat Assessment, Security Terminologies, Choosing a Network Security Approach, Network Security and the Law, Security Resources.

UNIT II	NETWORK DEFENCE	**9**

Denial of Service Attacks, Buffer Overflow Attacks, IP Spoofing, Session Hacking, Virus and Trojan horse Attacks. Firewall – Basic concepts, Implementing Firewalls, Selecting and Using a Firewall, Proxy Servers, Single Machine Firewalls, User Account Control, Windows and Linux Firewalls, Small Office/Home Office Firewalls, Medium-Sized Network Firewalls, Enterprise Firewalls. IDS – Basic concepts, Implementing IDS Systems, Implementing Honey Pots. Virtual Private Networks - Basic VPN Technology, Using VPN Protocols for VPN Encryption, IPSec, SSL, Implementing VPN Solutions.

UNIT III	COMMUNICATION DEFENSE & SYSTEM DEFENSE	**9**

Basic concepts, Modern Encryption Methods, Identifying Good Encryption, Digital Signatures and Certificates, Decryption, Cracking Passwords, Steganography, Steganalysis, Exploring the Future of Encryption. System Defence: Basic concepts, Configuring Windows, Configuring Linux, Patching the Operating System, Configuring Browsers. Virus - Virus Scanners, Antivirus Policies and Procedures, Additional Methods for Defending the System, Procedure to defend against Virus infected system. Trojan Horses, Spyware, and Adware.

Security policies, Assessing system security, Security standards, Physical security, Disaster recovery, Techniques used by attackers.		
UNIT IV	WIRELESS NETWORK DEFENCE	**9**
Wireless communication primer, Wireless LAN and their components, Network standards, Secure concerns, Secure WLAN Implementation, Examining wireless security solutions and countermeasures.		
UNIT V	CASE STUDY	**9**
Working with the sample Network penetration testing commands – Vulnerability Assessment, Exploitation, Privilege Escalation, Web Applications, Password Attacks, Networking & Shells, Metasploit.		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	**0**	**0**	**-**	**45**

TEXT BOOK

1. Chuck Easttom, "Network Defense and Countermeasures: Principles and Practices", Pearson education, Second edition, 2014.

References

1. Randy Weaver, Dawn Weaver, Dean Farwood, "Guide to Network Defense and Countermeasures", Cengage Learning, Third edition, 2014.

E-REFERENCES

1. E-council, "Network defence Architect" - http://www.eccouncil.org/Certification/certifiednetworkdefense-architect..
2. https://www.virtualhackinglabs.com/?courses=penetration-testing

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	1	3	3	2	3	2	1
CO2	3	3	2	2	2	2	3	3	2
CO3	2	3	3	2	3	2	2	2	1
CO4	3	3	2	2	3	2	3	3	2
CO5	3	3	3	3	3	3	3	3	2
Average	3	3	2	2	3	2	3	3	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI603A-DATA ANALYTICS

XCI603A			DATA ANALYTICS	L	T	P	SS	C
				4	0	0	2	6
C	P	A		L	T	P	SS	H
3	0	0		4	0	0	2	6

PREREQUISITE: Data Mining

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Analyze*** what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence	Cognitive	Analyze
CO2	***Evaluate***AI methods, and which AI methods may be suited to solving a given problem.	Cognitive	Evaluate
CO3	***Understand*** a given problem in the language/framework of different AI methods.	Cognitive	Understand
CO4	***Choose an*** algorithm on a problem formalization, and state the conclusions that the evaluation supports.	Cognitive	Apply
CO5	***Recognize*** the limitations of current Artificial Intelligence techniques	Cognitive	Analyze

UNIT I	**INTRODUCTION**	**12**
Data Definitions and Analysis Techniques: Elements, Variables, and Data Categorization,Levels of Measurement, Data Management and Indexing.		
UNIT II	**DESCRIPTIVE STATISTICS**	**12**
Descriptive Statistics: Measures of Central Tendency, Measures of Location of Dispersions, Error Estimation and Presentation (Standard Deviation, Variance), Introduction to Probability		
UNIT III	**BASIC ANALYSIS TECHNIQUES**	**12**
Basic Analysis Techniques: Statistical Hypothesis Generation and Testing, Chi-Square Test, T -Test, Analysis of Variance, Correlation Analysis, Maximum Likelihood Test.		
UNIT IV	**DATA ANALYSIS TECHNIQUES-I**	**12**
Data Analysis Techniques-I: Regression Analysis, Classification Techniques, Clustering Techniques (K-Means, K-Nearest Neighborhood). Data Analysis Techniques-II: Association Rules Analysis, Decision Tree.		
UNIT V	**INTRODUCTION TO R PROGRAMMING**	**12**
Introduction to R Programming: Introduction to R Software Tool, Statistical Computations using R (Mean, Standard Deviation, Variance, Regression, Correlation etc.). Practice and Analysis with R and Python Programming, Sensitivity Analysis.		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
60	0	0	30	60+30

TEXT BOOK

1. Probability and statistics for Engineers and Scientists (9 Edn.), Ronald E Walppole, Raymond H Myres, Sharon L. Myres and Leying Ye, Prentice Hall Inc
2. The Elements of Statistical Learning, Data Mining, Inference, and Prediction (2nd Edn.) Travor Hastie Robert Tibshirani Jerome Friedman, Springer, 2014

REFERENCES:

1. Software for Data Analysis: Programming with R (Statistics and Computing), John M. Chambers, Springer

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc. AI	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	1	1	1	1	2	1	1
CO2	0	1	3	2	3	2	1	2	2
CO3	1	2	3	0	3	2	2	2	2
CO4	1	2	3	1	3	2	2	1	2
CO5	0	3	0	1	0	2	3	1	2
Average	1	2	2	1	2	2	2	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI603B- MALWARE ANALYSIS

XCI603B			Malware Analysis	L	T	P	SS	C
				4	0	0	2	6
C	P	A		L	T	P	SS	H
3	0	0		4	0	0	2	6

PREREQUISITE: IoT

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Analyze*** what constitutes malware and how to identify systems with affected with malware	Cognitive	Analyze
CO2	***Evaluate*** Non self-reproducing Malware	Cognitive	Evaluate
CO3	***Understand the design of virus***	Cognitive	Understand
CO4	***Recognize the malware design***	Cognitive	Apply
CO5	***Recognize*** the limitations of current malware identification techniques	Cognitive	Analyze

UNIT I	**Introduction**	**12**
Introduction: Computer Infection Program- Life cycle of malware- Virus nomenclature- Worm nomenclature- Tools used in computer virology.		
UNIT II	Non self-reproducing Malware	**12**
Implementation of Covert Channel Non self-reproducing Malware- Working principle of Trojan Horse- Implementation of Remote access and file transfer- Working principle of Logical Bomb- Case Study: Conflicker C worm.		
UNIT III	Virus Design And Its Implications	**12**
Virus Design And Its Implications :Virus components- Function of replicator, concealer and dispatcher- Trigger Mechanisms- Testing virus codes- Case Study: Brute force logical bomb.		
UNIT IV	Malware Design	**12**
Malware Design Using Open Source :Computer Virus in Interpreted programming language- Designing Shell bash virus under Linux- Fighting over infection- Anti –antiviral fighting – Polymorphism		
UNIT V	**Case Study**	**12**
Case study: Companion virus. Virus And Worm Analysys Klez Virus- Clone Virus- Doom Virus- Black wolf worm- Sassar worm- Happy worm 99.		

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
60	0	0	30	60+30

TEXT BOOK

1. ErciFiliol, "Computer Viruses: from theory to applications", Springer, 1st edition, 2005
2. Mark.A .Ludwig, "The Giant black book of computer viruses,CreateSpace Independent Publishing Platform, 2 nd edition, 2009,ISBN 10: 144140712X

E-REFERENCES:

1. https://www.geeksforgeeks.org/introduction-to-malware-analysis/
2. https://intellipaat.com/blog/malware-analysis/

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	3	2	1	1	1	1	**1**	1	1
CO2	2	1	3	2	1	2	**1**	2	2
CO3	1	2	3	2	1	2	**1**	2	2
CO4	2	2	3	2	2	2	**0**	1	2
CO5	2	3	0	1	1	2	**1**	1	2
Average	2	2	2	2	1	2	**1**	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 603C- CLOUD COMPUTING

XCI603C			CLOUD COMPUTING	L	T	P	SS	C
				3	0	1	0	4
C	P	A		L	T	P	SS	H
3	0	0		3	0	2	0	5

PREREQUISITE: Fundamentals of Computer

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	***Recognize*** the importance of cloud computing behind all communications and day to day life activities.	Cognitive Psychomotor	Remember Perception
CO2	***Express*** the functionalities of each cloud services and aware of the various cloud service providers	Cognitive	Understand
CO3	***Employ*** the understanding of the various scheduling activities and actively ***participate*** in terms for the creation of various cloud services.	Cognitive	Apply Respond
CO4	***Utilize*** the cloud services tools effectively in the real world applications.	Cognitive	Apply
CO5	***Design*** and ***Establish*** the cloud services and cloud storage	Cognitive Psychomotor	Create Set

UNIT I	**INTRODUCTION TO CLOUD COMPUTING**	**9+6**

Definition, characteristics, components, Cloud service provider, the role of networks in Cloud computing, Cloud deployment models- private, public & hybrid, Cloud service models, multitenancy, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS: Google App Engine, Microsoft Azure, SaaS.

UNIT II	**VIRTUALIZATION**	**9+6**

Virtualization concepts , Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, VMware hypervisors and their features.

UNIT III	**DATA IN CLOUD COMPUTING**	**9+6**

Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. MapReduce and extensions: Parallel computing, the map-Reduce model, Parallel efficiency of MapReduce, Relational operations using Map-Reduce, Enterprise batch processing using MapReduce.

UNIT IV	**CLOUD SECURITY**	**9+6**

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro - architectures; Identity Management and Access control, Autonomic security, Security challenges : Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications in cloud.

UNIT V	ISSUES IN CLOUD COMPUTING			9+6
Implementing real time application over cloud platform, Issues in Inter -cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoringin a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring				
LECTURE	**TUTORIAL**	**PRACTICAL**	**SELF STUDY**	**TOTAL**
45	**0**		**-**	**45**
TEXT BOOK				
1. System Analysis and Design – Awadh **2.** Analysis & Design of Information system – James A. Senn –McGraw Hill				

Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CY	PO							PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**
CO1	1	1	2	1	1	2	1	2	1
CO2	2	2	1	1	1	2	1	2	1
CO3	2	1	2	1	1	2	1	2	1
CO4	2	2	2	1	1	2	1	1	1
CO5	2	1	3	2	1	1	2	1	1
Average	2	1	2	1	1	2	1	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XCI 604A HUMAN COMPUTER INTERACTION LAB

XCI604A	HUMAN COMPUTER INTERACTION LAB	L	T	P	C
		0	0	2	2
C:P:A	**0:1.5:0.5**	**L**	**T**	**P**	**H**
		0	**0**	**4**	**4**

Course Outcomes	**Domain**	**Level**
		60

1.Design a drop-down list or a menu in a GUI keeping in view the serial position effect
2. Design of a Mobile Keypad focusing on size, layout and devilling(a minimum of two different layouts)
3. Design of different icons in Graphical user Interface (a minimum of four different icons)
4. Design UI screens for the elderly people with unsteady hands keeping in view the mouse sensitivity
5. Design a menu structure for ordering house- hold items from a mall directly to your home through a mobile
phone interface. Categorize the items into menus and submenus. (make use of Hick's Law)
6. Design a prototype of a TV remote Control Panel
7. Design a Mobile Interface for a Mall Map
8. Design a Mobile Interface screens for railway enquiry system
9. To Developed a Web Interface for Online banking system
10.To Design a Web Interface for a University website

XCI 605A WEB TECHNOLOGIES LAB

XCI605A	WEB TECHNOLOGIES LAB	L	T	P	C
		0	0	2	2
C:P:A	**0:1.5:0.5**	**L**	**T**	**P**	**H**
		0	**0**	**4**	**4**

Course Outcomes	**Domain**	**Level**
		60

1. Formatting tags, ordered list and unordered list.
2.Tables, frame, image map and hyperlink.
3.Font, color and style
4. Background and Links
5.Form Validation
6.Looping and Conditional Statements
7. Strings and Operators
8.Flow of controls and Arrays
9.PHP Forms
10.PHP Functions
11.File Handling
12.Exception Handling
13. PHP Sessions and Cookies
14. PHP MySQL Connection

XCI605B MOBILE APPLICATION AND DEVELOPMENT LAB

XCI605B	MOBILE APPLICATION AND DEVELOPMENT LAB	L	T	P	C
		0	0	2	2
C:P:A	**0:1.5:0.5**	**L**	**T**	**P**	**H**
		0	**0**	**4**	**4**

Course Outcomes	**Domain**	**Level**
		60

1. Formatting tags, ordered list and unordered list.
2.Tables, frame, image map and hyperlink.
3.Font, color and style
4. Background and Links
5.Form Validation
6.Looping and Conditional Statements
7. Strings and Operators
8.Flow of controls and Arrays
9.PHP Forms
10.PHP Functions
11.File Handling
12.Exception Handling
13. PHP Sessions and Cookies
14. PHP MySQL Connection

XCI605C Cyber Crime investigation and digital forensics Lab

<table>
<tr><td rowspan="2">XCI605C</td><td rowspan="2">Cyber Crime investigation and digital forensics Lab</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>2</td></tr>
<tr><td rowspan="2">C:P:A</td><td rowspan="2">0:1.5:0.5</td><td>L</td><td>T</td><td>P</td><td>H</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>4</td></tr>
<tr><td colspan="2">Course Outcomes</td><td>Domain</td><td colspan="3">Level</td></tr>
<tr><td colspan="5"></td><td>60</td></tr>
<tr><td colspan="6">LIST OF PROGRAMS:
1. Computer Hacking & Network Intrusion.
2. Survey of Latest developments in Cyber Forensics.
3. Registry Editing and Viewing using native tools of OS.
4. Hex analysis using Hex Editors.
5. Bit level Forensic Analysis of evidential image using FTK, Encase and ProDiscover Tools.
6. Hash code generation, comparison of files using tools like HashCalcetc.
7. File analysis using Sleuthkitetc and Graphical File analysis and Image Analysis.
8. Email Analysis involving Header check, tracing route.
9. Performing a check on Spam mail and Non- Spam mail.
10. Create a file on a USB drive and calculate its hash value like FTK Imager. Change the file and calculate the hash value again to compare the files.
11. Extracting of files that have been deleted.
12. Locate and extract Image (JPEG) files with altered extensions.</td></tr>
</table>