

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM, THALAMBUR, PERIYAPALAYAM-CHENNAI
ACCREDITED BY NAAC WITH 'A++' GRADE

UNDERGRADUATE DEGREE PROGRAMME

B.Sc., Computer Science (Cyber Security)

Three Years

/

B.Sc., (Hons) Computer Science (Cyber Security)

Four Years

CURRICULUM & SYLLABUS

REGULATION 2024

Choice Based Credit System (CBCS)

&

Learning Outcomes Based Curriculum Framework (LOCF)

Effective from the Academic Year

2024 -2025

Department of Advanced Computing and Analytics
School of Computing Sciences

VELS

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
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DEPARTMENT OF ADVANCED COMPUTING AND ANALYTICS

VISION OF THE DEPARTMENT
Aims to provide quality education in the field of Computer Science with state of art facilities and handle quality research in association with industry and other Universities to produce well trained IT professionals in Computer Science domain.

MISSION OF THE DEPARTMENT	
M1	To Provide knowledge through teaching and training in the field of Computer Science.
M2	To concentrate on teaching-learning, research, project and consultancy help to increase the growth of IT and IT Enabled Services.
M3	To train students to get best opportunities and tackle challenges in IT industry.
M4	To equip students with communication skill, Leadership quality, ability to work with team help to improve the society.
M5	To provide value based and technical oriented related students help to build the nation.

PROGRAMME EDUCATIONAL OUTCOMES (PEO)	
PEO1	Graduates are prepared to be employed in IT industries by providing expected Domain Knowledge.
PEO2	Graduates are provided with practical training, hands-on and project experience to meet the industrial needs.
PEO3	Graduates are motivated in career and entrepreneurial skill development to become global leaders.
PEO4	Graduates are trained to demonstrate creativity, develop innovative ideas and to work in teams to accomplish a common goal.
PEO5	Graduates are addressed with social issues and guided to operate problems with Solution.

PROGRAMME OUTCOMES (PO)	
PO1	**Critical Thinking:** Apply knowledge of Cyber Security to identify, analyses problems and to provide effective solution in the area of Computing.
PO2	**Computing Skills:** Analyze a problem, identify and define the Computing requirements appropriate to its solution.
PO3	**Analytical skills:** Ability to design, develop algorithms and provide software solutions to cater the industrial needs.
PO4	**Modern Tool Usage:** Use current techniques, skills, and tools necessary for computing practices.
PO5	**Employability Skills:** Inculcate skills to excel in the fields of Information Technology and its Enabled services, Government and Private sectors, Teaching and Research.
PO6	**Ethics:** Insists ethical responsibilities, human and professional values and make their contribution to the society.
PO7	**Self-Directed and Life-long Learning:** Engaged in lifelong learning to equip them to the changing environment and be prepared to take-up mastering programmes.
PO8	**Individual and Team Work:** Function effectively as an individual, and as a member or a leader in diverse team and multidisciplinary settings.
PO9	**Project Management:** Demonstrate knowledge and understanding of the problem and management principles and apply these to one's own work.

PROGRAMME SPECIFIC OUTCOMES (PSO)	
PSO1	Ability to analyze a problem, Identify, Protect, Detect, Respond and Recover from a cyber-attack and implement security solution.
PSO2	Perform risk analysis and develop policies and procedures based on compliance and able to define the architecture, design, and management of the security of an organization.
PSO3	Apply multi-disciplinary knowledge required for cyber security industry and to develop an attitude for lifelong learning.
PSO4	Enhance research skills and utilize advanced privacy tools for analysis, design and implementation of security systems that capable of identify, prevent and protect from malware attack and real time problems

BOARD OF STUDIES

List of Members

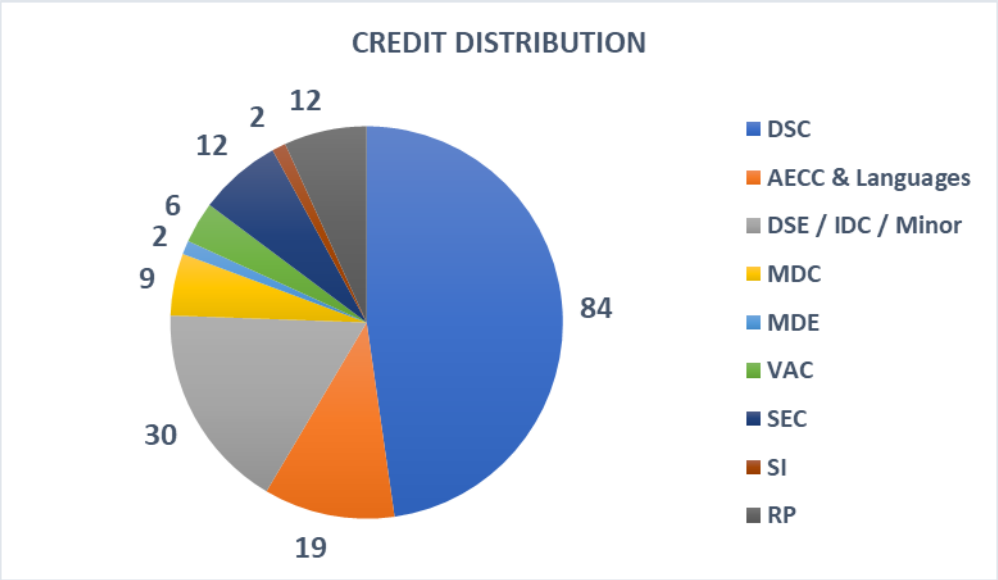
Department of Computer Science

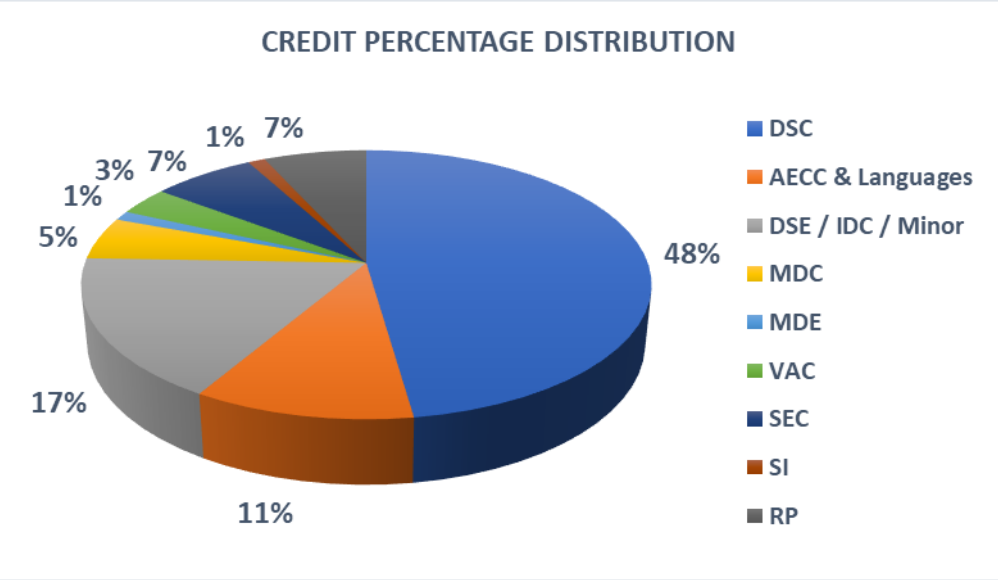
S. No	Name & Designation	Address	Role
1.	Dr. R. Sivakumar	Dean, School of Computing Sciences, VISTAS	
2.	Dr. P. Magesh Kumar	Director, School of Computing Sciences, VISTAS.	
3.	Dr. R. Ganesan	Professor and Dean, School of Computer Science and Engineering, VIT, Chennai Campus	External Member (Academic Expert)
4.	Mr. D. Rajkumar	Program Manager, Birla Soft, Prince Infocity Chennai	External Member (Industry Expert)
5.	Mr. K. Thirumurugan	Milestone Internet Marketing Private Limited, Team Lead-DX	Alumni, VISTAS
6.	Dr. R. Parameswari	Professor & Head, Department of Computer Science, VISTAS	Internal Member
7.	Dr. S. Perumal	Professor, Department of Computer Science, VISTAS	Internal Member
8.	Dr. G. Thailambal	Professor, Department of Computer Science, VISTAS	Internal Member
9.	Dr. S. Mangayarkarasi	Professor, Department of Computer Science, VISTAS	Internal Member
10.	Dr.A.S. Arunachalam	Professor, Department of Computer Science, VISTAS	Internal Member
11.	Dr.T.Sree Kala	Professor, Department of Computer Science, VISTAS	Internal Member
12.	Dr.R.Durga	Professor, Department of Computer Science, VISTAS	Internal Member
13.	Dr.A.Akila	Associate Professor, Department of Computer Science, VISTAS	Internal Member
14.	Dr.A.S.Aneetha	Associate Professor, Department of Computer Science, VISTAS	Internal Member
15.	Mr. R. Balamurugan	Assistant Professor, Department of Computer Science, VISTAS	Internal Member
16.	Ms. R. Padma	Assistant Professor, Department of Computer Science, VISTAS	Internal Member

CREDIT DISTRIBUTION

B.Sc., (Hons) Computer Science (Cyber Security)
Minimum credits to be earned: 176
B.Sc., Computer Science (Cyber Security)
Minimum credits to be earned: 132

Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	3 Yrs. Total Credits	VII Sem	VIII Sem	4 Yrs Total Credits
DSC	8	8	8	8	12	16	60	12	12	84
AECC & Languages	4	4	4	7	-	-	19	-	-	19
DSE / IDC / Minor	3	4	3	4	4	4	22	4	4	30
MDC	3	3	3	-	-	-	9	-	-	9
MDE	-	-	2	-	-	-	2	-	-	2
VAC	1	2	-	1	2	-	6	-	-	6
SEC	2	2	2	2	2	2	12	-	-	12
SI	-	-	1	-	1	-	2	-	-	2
RP	-	-	-	-	-	-	-	6	6	12
Total Credits	21	23	23	22	21	22	132	22	22	176





ABBREVIATIONS

DSC	Disciplinary Specific Core
AECC	Ability Enhancement Compulsory Courses
DSE	Disciplinary Specific Elective
IDC	Interdisciplinary / Minor Courses
MDC	Multidisciplinary Courses
MDE	Multidisciplinary Elective
VAC	Value Added Courses
SEC	Skill Enhancement Courses
SI	Summer Internship
RP	Research Project

CURRICULUM STRUCTURE

B.Sc., Computer Science (Cyber Security) Three Years

/

BSc., (Hons) Computer Science (Cyber Security) Four Years

Total number of Credits: 176

	B.Sc., Computer Science (Hons) Minimum Credits to be earned :176 B.Sc., Computer Science Minimum Credits to be earned: 132									
SEMESTER 1										
			Hours/Week					**Maximum Marks**		
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
LANG 1	24LTAM11/ 24LHIN11/ 24LFRE11	Tamil I / Hindi I / French I	2	0	0	1	2	40	60	100
ENG 1	24LENG11	English I	2	0	0	1	2	40	60	100
DSC 1	24CBCY11	C Programming and Embedded System	3	0	0	2	3	40	60	100
DSC 2	24CBCY12	Cyber Security	3	1	0	2	4	40	60	100
MDC 1	24BMA001	Mathematics- I	2	1	0	2	3	40	60	100
DSE 1/ IDC 1 / Minor 1	24DBCY1-	Discipline Specific Elective - I	3	0	0	2	3	40	60	100
DSC 1 (Lab)	24PBCY11	Practical I - C Programming and Embedded System Lab	0	0	2	1	1	40	60	100
VAC 1	24DVAC11	Universal Human Values	1	0	0	1	1	40	60	100
SEC 1	24SSKU11	Soft Skills I	2	0	0	1	2	40	60	100
SEC 2		Orientation Programme / Industrial Visit	-	-	-	-	-	-	-	-
			18	**2**	**2**	**-**	**21**	**-**	**-**	**-**

CIA - Continuous Internal Assessment SEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study**

SEMESTER 2										
			Hours/Week					Maximum Marks		
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
LANG 2	24LTAM21/ 24LHIN21/ 24LFRE21	Tamil II / Hindi II / French II	2	0	0	1	2	40	60	100
ENG 2	24LENG21	English II	2	0	0	1	2	40	60	100
DSC 3	24CBCY21	Object Oriented Programming Languages	3	0	0	2	3	40	60	100
DSC 4	24CBCY22	Operating Systems and Security	3	0	0	2	3	40	60	100
MDC 2	24BMA002	Mathematics – II	2	1	0	2	3	40	60	100
DSE 2 / IDC 2 / Minor 2	24DBCY2-	Discipline Specific Elective - II	4	0	0	2	4	40	60	100
DSC 3 (Lab)	24PBCY21	Practical II - Object Oriented Programming Languages Lab	0	0	2	1	1	40	60	100
DSC 4 (Lab)	24PBCY22	Practical III – Operating Systems and Security Lab	0	0	2	1	1	40	60	100
VAC 2	24DVAC21	Communication Skills	2	0	0	1	2	40	60	100
SEC 3	24SSKU21	Soft Skills II	2	0	0	1	2	40	60	100
			20	**1**	**4**	**-**	**23**	**-**	**-**	**-**

CIA - Continuous Internal Assessment SEE - Semester End Examination

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SEMESTER 3										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
LANG 3	24LTAM31/ 24LHIN31/ 24LFRE31	Tamil III / Hindi III / French III	2	0	0	1	2	40	60	100
ENG 3	24LENG31	English III	2	0	0	1	2	40	60	100
AECC 1	24EVS031	Environmental Studies	3	0	0	2	3	40	60	100
DSC 5	24CBCY31	Problem Solving using Python Programming	3	0	0	2	3	40	60	100
DSC 6	24CBCY32	Advanced Database Systems	3	0	0	2	3	40	60	100
DSE 3 / IDC 3 / Minor 3	24DBCY3-	Discipline Specific Elective - III	3	0	0	2	3	40	60	100
DSC 5 (Lab)	24PBCY31	Practical IV - Problem Solving using Python Programming Lab	0	0	2	1	1	40	60	100
DSC 6 (Lab)	24PBCY32	Practical V – Advanced Database Systems Lab	0	0	2	1	1	40	60	100
MDE 1	24EMDE31	Indian Knowledge System	2	0	0	1	2	40	60	100
SEC 4	24SSKU31	Soft Skills III	2	0	0	1	2	40	60	100
SI 1	24IBCY31	Internship I	0	0	2	1	1	-	100	100
			20	0	6	-	23	-	-	-

CIA - Continuous Internal Assessment SEE - Semester End Examination

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SEMESTER 4										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
LANG 4	24LTAM41/ 24LHIN41/ 24LFRE41	Tamil IV / Hindi IV / French IV	2	0	0	1	2	40	60	100
ENG 4	24LENG41	English IV	2	0	0	1	2	40	60	100
DSC 7	24CBCY41	Ethical Hacking	3	0	0	2	3	40	60	100
DSC 8	24CBCY42	Data Communication and Networking	3	0	0	2	3	40	60	100
MDC 3	24BMA003	Statistics	2	1	0	2	3	40	60	100
DSE 4 / IDC 4 / Minor 4	24DBCY4-	Discipline Specific Elective -IV	4	0	0	2	4	40	60	100
DSC 7 (Lab)	24PBCY41	Practical VI - Ethical Hacking Lab	0	0	2	1	1	40	60	100
DSC 8 (Lab)	24PBCY42	Practical VII – Network Communication Lab	0	0	2	1	1	40	60	100
SEC 5	24SBCY41	Industry Oriented Employability Skills	1	0	2	1	2	40	60	100
VAC 3	24DVAC41	Yoga Education / NSS / NCC	0	0	2	1	1	-	100	100
SEC 6		In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-	-	-	-
			17	1	8	-	22	-	-	-

CIA - Continuous Internal Assessment SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study

SEMESTER 5										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
DSC 9	24CBCY51	Applied Cryptography	3	0	0	2	3	40	60	100
DSC 10	24CBCY52	Android Application Development	3	0	0	2	3	40	60	100
DSC 11	24CBCY53	Machine Learning for Cyber Security	3	1	0	2	4	40	60	100
DSE 5 / IDC 5 / Minor 5	24DBCY5-	Discipline Specific Elective – V	4	0	0	2	4	40	60	100
DSC 9 (Lab)	24PBCY51	Practical VIII- Cryptography Lab	0	0	2	1	1	40	60	100
DSC 10 (Lab)	24PBCY52	Practical IX - Android Application Development Lab	0	0	2	1	1	40	60	100
SEC 7	24SBCY51	Entrepreneurial Development	2	0	0	1	2	40	60	100
VAC 4	24DVAC51	Value Education	2	0	0	1	2	40	60	100
SI 2	24IBCY51	Internship II	0	0	2	1	1	-	100	100
SEC 8		Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-	-	-	-
			17	1	6	-	21	-	-	-

CIA - Continuous Internal Assessment **SEE - Semester End Examination**

***L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study**

SEMESTER 6										
			Hours/Week					Maximum Marks		
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
DSC 12	24CBCY61	Cyber Crime Investigation and Digital Forensics	3	0	0	2	3	40	60	100
DSC 13	24CBCY62	Introduction to generative AI	3	1	0	2	4	40	60	100
DSC 14	24CBCY63	Block Chain & Crypto currency	4	0	0	2	4	40	60	100
DSC 15	24CBCY64	Penetration Testing	4	0	0	2	4	40	60	100
DSE 6 / IDC 6 / Minor 6	24DBCY6-	Discipline Specific Elective – VI	4	0	0	2	4	40	60	100
DSC 12 (Lab)	24PBCY61	Practical X - Cyber Crime Investigation and Digital Forensics Lab	0	0	2	1	1	40	60	100
SEC 9	24SBCY61	Mini Project	0	0	4	1	2	-	100	100
SEC 10		On Job Training / Apprenticeship / Startup	-	-	-	-	-	-	-	-
			18	1	**6**	-	**22**	-	-	-

CIA - Continuous Internal Assessment **SEE - Semester End Examination**

***L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study**

SEMESTER 7										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
DSC 16	24CBCY71	DevOps Security	3	0	0	2	3	40	60	100
DSC 17	24CBCY72	Incident Response and Threat Intelligence	4	0	0	2	4	40	60	100
DSC 18	24CBCY73	Intrusion Detection and Prevention System	3	1	0	2	4	40	60	100
DSE 7 / IDC 7 / Minor 7	24DBCY7-	Discipline Specific Elective – VII	4	0	0	2	4	40	60	100
DSC 16 (Lab)	24PBCY71	Practical XI- DevOps Security Lab	0	0	2	1	1	40	60	100
RP 1	24RBCY71	Research Project I	0	0	12	4	6	40	60	100
			14	1	14	-	22	-	-	-

CIA - Continuous Internal Assessment SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study

SEMESTER 8										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	O	C	CIA	SEE	Total
DSC 19	24CBCY81	Malware Analysis and Reverse Engineering	3	0	0	2	3	40	60	100
DSC 20	24CBCY82	Data Science using R	3	0	0	2	3	40	60	100
DSC 21	24CBCY83	Cyber Laws in India	4	0	0	2	4	40	60	100
DSE 8 / IDC 8 / Minor 8	24DBCY8-	Discipline Specific Elective -VIII	3	1	0	2	4	40	60	100
DSC 19 (Lab)	24PBCY81	Practical XII - Malware Analysis and Reverse Engineering Lab	0	0	2	1	1	40	60	100
DSC 20 (Lab)	24PBCY82	Practical XIII - Data Science using R Lab	0	0	2	1	1	40	60	100
RP 2	24RBCY81	Research Project II	0	0	12	4	6	-	60	100
			13	1	16	-	22	-	-	-

CIA - Continuous Internal Assessment SEE - Semester End Examination

*L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study

DISCIPLINARY SPECIFIC CORE COURSES

Category	Code	Course	L	T	P	O	C
DSC 1	24CBCY11	C Programming and Embedded System	3	0	0	2	3
DSC 2	24CBCY12	Cyber Security	3	1	0	2	4
DSC 1 (Lab)	24PBCY11	C Programming and Embedded System Lab	0	0	2	1	1
DSC 3	24CBCY21	Object Oriented Programming Languages	3	0	0	2	3
DSC 4	24CBCY22	Operating Systems and Security	3	0	0	2	3
DSC 3 (Lab)	24PBCY21	Object Oriented Programming Languages Lab	0	0	2	1	1
DSC 4 (Lab)	24PBCY22	Operating Systems and Security Lab	0	0	2	1	1
DSC 5	24CBCY31	Problem Solving using Python Programming	3	0	0	2	3
DSC 6	24CBCY32	Advanced Database Systems	3	0	0	2	3
DSC 5 (Lab)	24PBCY31	Problem Solving using Python Programming Lab	0	0	2	1	1
DSC 6 (Lab)	24PBCY32	Advanced Database Systems Lab	0	0	2	1	1
DSC 7	24CBCY41	Ethical Hacking	3	0	0	2	3
DSC 8	24CBCY42	Data Communication and Networking	3	0	0	2	3
DSC 7 (Lab)	24PBCY41	Ethical Hacking Lab	0	0	2	1	1
DSC 8 (Lab)	24PBCY42	Network Communication Lab	0	0	2	1	1
DSC 9	24CBCY51	Applied Cryptography	3	0	0	2	3
DSC 10	24CBCY52	Android Application Development	3	0	0	2	3
DSC 11	24CBCY53	Machine Learning for Cyber Security	3	1	0	2	4
DSC 9 (Lab)	24PBCY51	Cryptography Lab	0	0	2	1	1

DSC 10 (Lab)	24PBCY52	Android Application Development Lab	0	0	2	1	1
DSC 12	24CBCY61	Cyber Crime Investigation and Digital Forensics	3	0	0	2	3
DSC 13	24CBCY62	Introduction to Generative AI	3	1	0	2	4
DSC 14	24CBCY63	Block Chain & Crypto Currency	4	0	0	2	4
DSC 15	24CBCY64	Penetration Testing	4	0	0	2	4
DSC 12 (Lab)	24PBCY61	Cyber Crime Investigation and Digital Forensics Lab	0	0	2	1	1
DSC 16	24CBCY71	DevOps Security	3	0	0	2	3
DSC 17	24CBCY72	Incident Response and Threat Intelligence	4	0	0	2	4
DSC 18	24CBCY73	Intrusion Detection and Prevention System	3	1	0	2	4
DSC 16 (Lab)	24PBCY71	DevOps Security Lab	0	0	2	1	1
DSC 19	24CBCY81	Malware Analysis and Reverse Engineering	3	0	0	2	3
DSC 20	24CBCY82	Data Science using R	3	0	0	2	3
DSC 21	24CBCY83	Cyber Laws in India	4	0	0	2	4
DSC 19 (Lab)	24PBCY81	Malware Analysis and Reverse Engineering Lab	0	0	2	1	1
DSC 20 (Lab)	24PBCY82	Data Science using R Lab	0	0	2	1	1

DISCIPLINARY SPECIFIC ELECTIVE COURSES

Category	Code	Course	L	T	P	O	C
DSE 1	24DBCY11	Fundamentals of Computing	3	0	0	2	3
	24DBCY12	Digital Logic Fundamentals					
DSE 2	24DBCY21	Data Structures and Algorithms	4	0	0	2	4
	24DBCY22	Introduction to Artificial Intelligence					
DSE 3	24DBCY31	Foundation of Data Science	3	0	0	2	3
	24DBCY32	Software Quality Assurance					
DSE 4	24DBCY41	Internet of Things	4	0	0	2	4
	24DBCY42	Cloud Computing					
DSE 5	24DBCY51	Robotic Process Automation	3	1	0	2	4
	24DBCY52	Social Network Security					
DSE 6	24DBCY61	Augmented Reality	4	0	0	2	4
	24DBCY62	Big Data Analytics					
DSE 7	24DBCY71	Multimedia and its Applications	4	0	0	2	4
	24DBCY72	Cognitive Computing					
DSE 8	24DBCY81	Green Computing	3	1	0	2	4
	24DBCY82	Design Thinking					

AECC & LANGUAGES

Category	Code	Course	L	T	P	O	C
LANG 1	24LTAM11/ 24LHIN11/ 24LFRE11	Tamil I / Hindi I/ French I	2	0	0	1	2
ENG 1	24LENG11	English I	2	0	0	1	2
LANG 2	24LTAM21/ 24LHIN21/ 24LFRE21	Tamil II / Hindi II / French II	2	0	0	1	2
ENG 2	24LENG21	English II	2	0	0	1	2
LANG 3	24LTAM31/ 24LHIN31/ 24LFRE31	Tamil III / Hindi III/ French III	2	0	0	1	2
ENG 3	24LENG31	English III	2	0	0	1	2
LANG 4	24LTAM41/ 24LHIN41/ 24LFRE41	Tamil IV/ Hindi IV/ French IV	2	0	0	1	2
ENG 4	24LENG41	English IV	2	0	0	1	2
AECC 1	24EVS041	Environmental Studies	3	0	0	2	3

MULTIDISCIPLINARY COURSES

Category	Code	Course	L	T	P	O	C
MDC 1	24BMA001	Mathematics- I	2	1	0	2	3
MDC 2	24BMA002	Mathematics – II	2	1	0	2	3
MDC 3	24BMA003	Statistics	2	1	0	2	3

MULTIDISCIPLINARY ELECTIVES

MDE 1	24EMDE31	Indian Knowledge System	2	0	0	1	2

VALUE ADDED COURSES

Category	Code	Course	L	T	P	O	C
VAC 1	24DVAC11	Universal Human Values	1	0	0	1	1
VAC 2	24DVAC21	Communication Skills	2	0	0	1	2
VAC 3	24SNSS41	Yoga Education / NSS / NCC	0	0	2	1	1
VAC 4	24DVAC51	Value Education	2	0	0	1	2

SKILL ENHANCEMENT COURSES

Category	Code	Course	L	T	P	O	C
SEC 1	24SSKU11	Soft Skills I	2	0	0	1	2
SEC 2	24SBCY11	Orientation Programme / Industrial Visit	-	-	-	-	-
SEC 3	24SSKU21	Soft Skills II	2	0	0	1	2
SEC 4	24SSKU31	Soft Skills III	2	0	0	1	2
SEC 5	24SBCY41	Industry Oriented Employability skills	1	0	2	1	2
SEC 6		In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-
SEC 7	24SBCY51	Entrepreneurial Development	2	0	0	1	2
SEC 8		Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-
SEC 9	24SBCY61	Mini Project	0	0	4	1	2
SEC 10		On Job Training / Apprenticeship / Startup	-	-	-	-	-

SUMMER INTERNSHIP

Category	Code	Course	L	T	P	O	C
SI 1	24IBCY31	Internship I	0	0	2	1	1
SI 2	24IBCY51	Internship II	0	0	2	1	1

RESEARCH PROJECT

Category	Code	Course	L	T	P	O	C
RP 1	24RBCY71	Research Project I	0	0	12	4	6
RP 2	24RBCY81	Research Project II	0	0	12	4	6

SEMESTER I

24LTAM11 **தமிழ்மொழிப்பாடம்-1**

L	T	P	O	C
2	0	0	1	2

மொழிவரலாறு – சங்க இலக்கியம் – அற இலக்கியம் – மொழித்திறன்

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், தற்கால தமிழ் இலக்கிய வகைமைகளான மரபுக்கவிதை, புதுக்கவிதை, உரைநடை ஆகியவற்றை அறிமுகப்படுத்துதல், தமிழர்தம் வாழ்வியல் நெறிகளையும் பண்பாட்டுச் செழுமைகளையும் இன்றைய தலைமுறையினர் அறியச் செய்தல், மாணவர்களுக்குத் தமிழைத் தவறின்றி எழுதுவதற்குத் தேவையான பயிற்சி அளித்து அவர்களின் மொழித்திறனை மேம்படுத்துதல், செய்யுளின் நலத்தைப் பாராட்டும் முறைமையை அறியச் செய்து அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களுக்கு வேலைவாய்ப்பை உருவாக்குவதும் இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு- 1: தமிழ் மொழி வரலாற **8 மணி நேரம்**

மொழிக்குடும்பம் - இந்திய மொழிக்குடும்பங்கள் - இந்திய ஆட்சி மொழிகள் - திராவிட மொழிக்குடும்பங்கள் - திராவிட மொழிகளின் வகைகள் –திராவிட மொழிகளின் சிறப்புகள் - திராவிட மொழிகளின் வழங்கிடங்கள் - திராவிட மொழிகளுள் தமிழின் இடம் - தமிழ்மொழியின் சிறப்புகள் - தமிழ் பிறமொழித் தொடர்புகள்.

அலகு -2 **8 மணி நேரம்**

புறநானூறு- பாடல் எண்: , 182, 183, – இரண்டு பாடல்கள்.

குறுந்தொகை- பாடல் எண்: 2, 167, - இரண்டு பாடல்கள்

பரிபாடல் - முருகன். வையை - இரண்டு பாடல்கள்

அலகு - 3 அற இலக்கியங்கள் **8 மணி நேரம்**

திருக்குறள்- வான்சிறப்பு (அறம்), பெருமை (பொருள்), பிரிவாற்றாமை (இன்பம்),. மூன்று அதிகாரங்கள் முழுமையும்

1. நாலடியார் - இரண்டு பாடல்கள். (2, 3)
2. மூதுரை - இரண்டு பாடல்கள். (2, 8)

அலகு 4 மொழி **07 மணி நேரம்**

பிழை நீக்கி எழுதுதல் - ஒற்றுப்பிழை நீக்கி எழுதுதல் - தொடர்பிழை நீக்கி எழுதுதல் - ஒற்று மிகும் இடங்கள் - ஒற்று மிகா இடங்கள் - பிற மொழிச் சொற்களை நீக்கி எழுதுதல் – பயிற்சிகள்.

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்:

1. **தமிழர் நாகரிகமும் பண்பாடும்**, டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
2. **தவறின்றித் தமிழ் எழுதுவோம்**, மா. நன்னன், ஏகம் பதிப்பகம், 1999.
3. **தவறின்றித் தமிழ் எழுத** - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
4. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காதெமி, 2002.
5. **புதிய தமிழ் இலக்கிய வரலாறு**, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.
6. **செம்மொழி தமிழின் சிறப்பியல்புகள்** - முனைவர் மறைமலை இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
7. **பாடநூல் தேடலுக்கான இணையம்** - https://archive.org/

24LHIN11 **HINDI-I**

L	T	P	O	C
2	0	0	1	2

(Prose, Letter Writing & Functional Words)

वर्ष I - सत्र I (गद्य, पत्र लेखन & व्यावहारिक हिन्दी)

COURSE OBJECTIVES:

- To understand the rural life style, social responsibilities and social values
- To create awareness about the importance of varied culture
- To enable the students to develop communication skill in Hindi and to use Azhagi, Azhagi+ fonts

UNIT I : 'Smruti' (Kahani) by Pandit Sriram Sharma. 6hrs.
पं. श्रीराम शर्मा कृत 'स्मृति' (कहानी)

UNIT II : 'Athiti tum kab jaaoge' (Vyangy) by Sharad Joshi. 6hrs.
शरद जोशी कृत 'अतिथि तुम कब जावोगे' (व्यंग्य)

UNIT III: 'Atatho Ghumakkad Jigyasa' (Yatra Vruthanth) by Rahul Sanskrityayan. 6hrs.
राहुल सांस्कृतयायन कृत 'अथातो घुमक्कड़ जिज्ञासा' (यात्रा वृत्तान्त)

UNIT IV: Functional Hindi-Phrases used in Letter Writing.
Skill development - Bhav Ek Bhasha Anek 6hrs.
व्यावहारिक हिन्दी- पत्र लेखन में प्रयुक्त वाक्यांश ,
कौशल विकास - भाव एक भाषा अनेक

UNIT V : Letter Writing- Intro. & Types & 3 Personal Letters 6hrs.
Introduction to Azhagi, Azhagi + fonts
पत्र लेखन - परिचय व प्रकार , 3 अनोपचारिक पत्र
अलगी, अलगी + फ़ॉन्ट का परिचय

Total: 30hrs.

Total: 30hrs.

COURSE OUTCOMES:

At the end of this course Students will be able to

CO1 Gain knowledge about the rural life style

CO2 Understand social values

CO3 Understand importance of varied culture

CO4 Journalise in Functional Hindi

CO5 Use Azhagi, Azhagi+ fonts

TEXT BOOKS:

1. Pandit Shriram Sharma, Shikaar, Sahitya Sadan, 1932.
2. Sharad Joshi, Yatha Sambhav, Bharatiya Gyanpeet, 2014.
3. Rahul Sanskrityayan, Ghumakkad Shastra, Rajkamal Prakashan, 1949.

REFERENCE BOOKS:

1. Kendriya Hindi Sansthan, Banking Hindi Patyakram, 2012.
2. NCERT, Sparsh, Class 9.
3. Main Aur Mera Vyakaran, New Saraswati House, New Delhi.
4. Govind Ballabh Sharma, Hindi Vyavaharik Tankan Kala Evam Tankan Abhyas, Neelkanth Publishers Pvt. Ltd., 2022.

WEB RESOURCES :

1. Pandit Sriram Sharma ka kahani: https://www.evidyarthi.in
2. Harishankar parasayi ka Vyangy: http://gadyakosh.org
3. Rahul Sanskrityayan ka yatravruttant: https://www.hindwi.org
4. Prayojanmoolak Hindi:https://hi.mwikipedia.org
5. https://www.azhagi.com/hnd/helphtml/Introduction.

24LFRE11 **FRENCH – I**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

The lessons are being chosen:

1) To greet, to express excuse and to introduce oneself
2) To introduce another person
3) To express his/her ideas, opinions and weekend projects
4) To request someone to do something, polite manners
5) To accept, refuse, enquire and indicate the time and date
6) To express himself / herself in positive and negative manner

UNITS:

1) SALUT

les nombres, Les jours de la semaine et du mois, La nationalité **4**

2) ENCHANTÉ

Les verbes Etre, Avoir, Aller, Regular ER verbes, Present tense. **6**

3) J'ADORE

La negation, l'adjectif possessif, le futur proche **4**

4) TU VEUX BIEN

Les articles de finis/indéfinis, Les pronoms après une préposition (avec lui, chez moi), Le passé composé **7**

5) ON SE VOIT QUAND

Les pronoms compléments directs me, te, nous, vous, L'interrogation avec est-ce que, L'heure et la date. **5**

6) BONNE IDÉE

Les articles partitifs, Le masculin et le féminin des adjectifs, Les pronoms compléments directs le, la, les, La négation : ne… pas de. **4**

Total: 30 Hours

COURSE OUTCOMES:

1) The students would be able to greet, to excuse and to introduce himself.
2) The students would be able to introduce someone.
3) The students would be able to express his ideas, opinions and weekend projects.
4) The students would be able to ask someone to do something, polite manner.
5) The students would be able to accept, refuse enquire and indicate the time and date.
6) The students would be able to express himself in positive and negative manner.

TEXT BOOKS :

1. LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau

REFERENCE BOOKS:

1. SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

24LENG11 **ENGLISH - I**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To enable students to develop their communication skills effectively.
- To make students familiar with usage skills in the English Language.
- To enrich their vocabulary in English.
- To develop communicative competence.

UNIT I- PROSE **Credit Hours 06**

- Dangers of drug abuse - Hardin B.Jones
- Tight corners - E.V.Lucas

UNIT II -POETRY **06**

- Ecology - A.K.Ramanujan
- The owl and the chimpanzee - Jo Camacho

UNIT III - SHORT STORY **06**

- The Dear Departed - Stanley Houghton
- The Fool's Paradise- Isaac Bashevis Singer

UNIT IV -GRAMMAR **06**

- Parts of speech, Articles

UNIT V -GRAMMAR **06**

- One-word substitution, prefix, suffix, synonym, antonym.

Total: 30 Hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

CO1	Understand the characteristic features of the language used in the text.
CO2	Strengthen their knowledge of basic grammar
CO3	Improve narrative skills after studying diverse prose and play.
CO4	Understand to classify parts of speech and articles.
CO5	Develop critical writing skills in the textual content of the syllabus.

REFERENCE BOOKS:

1. Jeya Santhi (2015), English for Communication Enrichment:
2. Anu Chitra (2012), Dr. M. Narayana Rao and Dr. B. G.Barki–Anu's Current English for Communication
3. Anu Chithra (2010),Dr. Ananthan, R. Effective Communication. Ed. Chennai.

24CBCY11 C PROGRAMMING AND EMBEDDED SYSTEM

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To express algorithms and draw flowcharts in a language independent manner. Write, compile and debug programs in C language. Use different data types in a computer program. To describe the techniques for creating program modules in C using functions and recursive functions. To provide an overview of principles of Embedded System. To provide a clear understanding of role of firmware, operating systems in correlation with hardware systems.

UNIT- I INTRODUCTION TO C PROGRAMMIMG 9

Introduction- Algorithm, Pseudo code, Flow chart, Identifiers, Data Types, Variables, Constants, Input / Output, Operators, Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Storage classes-auto, register, static, extern, scope rules,

UNIT-II CONTROL STRUCTURES AND FUNCTIONS 9

Statements- Selection Statements– if and switch statements, loops- while, for, do-while, Functions- Introduction to Structured Programming, Functions- basics, user defined functions, call by value, call by REFERENCE BOOKS.

UNIT-III ARRAYS AND POINTERS 9

Arrays– Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays, arrays to functions, recursive functions, Pointers – pointers to pointers, Pointer Applications, Arrays and Pointers, Pointer Arithmetic, memory allocation functions, array of pointers, command –line arguments, Introduction to structures and unions.

UNIT – IV INTRODUCTION TO EMBEDDED SYSTEMS 9

Definition of Embedded System, Embedded Systems vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Major application areas, Purpose of Embedded Systems, Characteristics and Quality attributes of Embedded Systems.

UNIT– V EMBEDDED C PROGRAMMING 9

The Typical Embedded System - Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System components. Embedded Firmware Design and Development- Embedded Firmware Design, Embedded

Firmware Development Languages, Introduction to Softwares, Kiel Compiler, Proteus, Introduction to Embedded C- Difference between C & Embedded C, Advantages of Embedded C, Embedded C Program: Basics, Keywords, Data Types, Structure, Components, Programming style, Applications of the Embedded C Program.

Total: 45 Hours

COURSE OUTCOMES:

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

CO1: Understand how to write modular, efficient and readable C programs. To impart knowledge in creating and using Arrays of the C data types

CO2: Design programs involving decision structures, loops, arrays and functions.

CO3: Identify the difference between call by value and call by REFERENCE BOOKS.

CO4: Understand the selection procedure of processors in the embedded domain.

CO5: Design procedure of embedded firm ware.

TEXT BOOKS:

1. B.A.Forouzan and R.F. Gilberg(2021), Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning.
2. Balaguruswamy (2019),"Programming in ANSI C", 8th Edition, McGraw Hill Education, ISBN: 978-93-5316-513-0.
3. Yashavant P. Kanetkar (2019), "Let Us C", 16th Edition, BPB Publications, ISBN: 978- 93- 8728-449-4.

REFERENCE BOOKS:

1. Brian Kernighan and Dennis Ritchie (2015),"The C Programming Language", 2nd edition.
2. Shibu K V (2017), "Introduction to Embedded Systems", Second Edition, Mc Graw Hill.
3. Rajkamal (2003), "Embedded Systems Architecture, Programming and Design", Tata McGraw-Hill.
4. Frank Vahid and Tony Givargis (2002), "Embedded Systems Design" - A Unified Hardware/Software Introduction, John Wiley

WEB RESOURCES:

1. https://www.electronicshub.org/basics-of-embedded-c-program/
2. https://www.mygreatlearning.com/blog/embedded-c/

24CBCY12 **CYBER SECURITY**

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

This course provides the foundation for understanding the key issues associated with protecting information assets. The purpose of the course is to provide the student with an overview of the field of information security and assurance.

UNIT I INTRODUCTION 12

Introduction to Cyber Security - Importance and challenges in Cyber Security - Cyberspace - Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism - Cyber Security of Critical Infrastructure - Cyber security -Organizational Implications.

UNIT II HACKERS AND CYBER CRIMES 12

Types of Hackers - Hackers and Crackers - Cyber-Attacks and Vulnerabilities - Malware threats - Sniffing - Gaining Access - Escalating Privileges - Executing Applications - Hiding Files - Covering Tracks - Worms - Trojans - Viruses - Backdoors

UNIT III ETHICAL HACKING AND SOCIAL ENGINEERING 12

Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance - Threat Modeling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social Engineering Targets and Defense Strategies.

UNIT IV CYBER FORENSICS AND AUDITING 12

Introduction to Cyber Forensics - Computer Equipment and associated storage media - Role of forensics Investigator - Forensics Investigation Process - Collecting Network based Evidence - Writing Computer Forensics Reports - Auditing - Plan an audit against a set of audit criteria - Information Security Management System Management. Introduction to ISO 27001:2013.

UNIT V CYBER ETHICS AND LAWS 12

Introduction to Cyber Laws - E-Commerce and E-Governance - Certifying Authority and Controller - Offences under IT Act- Computer Offences and its penalty under IT Act 2000 - Intellectual Property Rights in Cyberspace.

Total: 60 Hours

COURSE OUTCOMES:

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

CO-1: Understand the broad set of technical, social & political aspects of Cyber Security.

CO-2: Explore about Various types of Hackers and Threats and ways of sniffing.

CO-3: Understand the importance of ethical hacking tool and Process.

CO-4: Implementing ethical hacking tools in an organization.

CO-5: Apply methods for authentication, access control, intrusion detection and prevention and conduct research in Cyber Security.

TEXT BOOKS:

1. Donaldson, S., Siegel, S., Williams, C.K., Aslam, A (2015), "Enterprise Cyber security - How to Build a Successful Cyber defense Program against Advanced Threats", Apress, 1st Edition.
2. Nina Godbole, Sumit Belapure (2011), "Cyber Security", Willey.

REFERENCE BOOKS:

1. Roger Grimes (2017), "Hacking the Hacker", Wiley, Ist Edition.
2. Cyber Law by Bare Act, Govt of India, It Act 2000.

24PBCY11 C PROGRAMMING AND EMBEDDED SYSTEM LAB

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

This course is emphasizing the nature of C language using many applications and helps to understand the need to choose the language for solving the problem. The students can understand the art of computer programming.

LIST OF PROGRAMS:

1. Write a C program to find grade of a list of students given their marks.
2. Write a C program for counting the number of vowels, consonants, words, white spaces in a line of text and array of lines.
3. Write a C program for palindrome.
4. Write a C program for Fibonacci sequence.
5. Write a C program to find GCD of two numbers.
6. Write a program to find NCR and NPR.

EMBEDDED C

1. Write a simple program to show a delay.
2. Write a loop application to copy values from P1 to P2.
3. Write a C program for counting the no of times that a switch is pressed & released.
4. Write a simple program to create a portable hardware delay.
5. Write a C program to test loop time outs.
6. Develop & implement a program for intruder alarm system

Total : 15 Hours

COURSE OUTCOMES:

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

CO1: Students will be able to develop simple applications in C using basic constructs.

CO2: Able to design and implement applications in C using Arrays and Strings.

CO3: Perform effectively as entry level Embedded Systems professionals.

CO4: Independently design and develop a hardware platform encompassing a microcontroller and peripherals.

CO5: Write programs to generate hardware delays and timeouts.

REFERENCE BOOKS:

1. C Programming for Embedded Systems, Kirk Zurell, Sofie Beerens, CRC Press (March 1, 2000)
2. Embedded C, Mikael J. Pont, Addison-Wesley Professional (May 4, 2002)

WEB RESOURCES:

1. https://www.javatpoint.com/embedded-system-c-programming
2. https://www.electronicshub.org/basics-of-embedded-c-program/

SEMESTER II

24LTAM21 **தமிழ் மொழிப்பாடம்-2**

L	T	P	O	C
2	0	0	1	2

காப்பியம், பக்தி இலக்கியம், கலைகள், நாகரிகம்-பண்பாடு

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், அற இலக்கியங்கள், சிற்றிலக்கியம், சிறுகதை ஆகியவற்றை அறிமுகப்படுத்துதல், தற்காலப் பேச்சுத் தமிழ் எழுத்துத்தமிழ் ஆகியவற்றின் வளர்நிலைகளை மாணவர்களை அறியச் செய்தல், அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களின் மொழித் திறனை மேம்படுத்த அவர்களுக்குக் கடிதம் எழுதும் கலையைக் கற்றுக்கொடுத்தல், அணி இலக்கணத்தை அறியச் செய்தல் என்பன இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1 காப்பியங்கள் 08 மணி நேரம்

சிலப்பதிகாரம்- கனாத்திறம் உரைத்தக் காதை முழுவதும்.

மணிமேகலை- மலர்வனம் புக்க காதை முழுவதும்.

கம்பராமாயணம் - குகப் படலம் (தேர்ந்தெடுக்கப்பட்ட ஒன்பது பாடல்கள்)

அலகு 2: பக்தி இலக்கியம் 08 மணி நேரம்

1. மாணிக்கவாசகர் - திருவாசகம் – மூன்று பாடல்கள்
   - ✓ புல்லாகி பூடாகி (சிவபுராணம்)
   - ✓ எல்லாப் பிறப்பும் (சிவபுராணம்)
   - ✓ உற்றாரை யான் வேண்டேன் (திருப்புலம்பல்)
2. ஆண்டாள் - திருப்பாவை – மூன்று பாடல்கள் (1, 3, 4)
   - ✓ மார்கழித் திங்கள் … (பாசுரம் 1)

✓ ஓங்கி உலகளந்த… (பாசுரம் 3)

✓ ஆழிமழைக் கண்ணா… (பாசுரம் 4)

3. வீரமாமுனிவர் - தேம்பாவணி – வளன் சென்னித்தப் படலம்

4. சீறாப்புராணம்- மானுக்கு பிணை நின்ற படலம்

அலகு 3 கலைகள் **07 மணி நேரம்**

சிற்பம் - ஓவியம் - இசை - கூத்து - ஒப்பனை - ஆடை அணிகலன்கள்.

அலகு 4 நாகரிகம், பண்பாடு **07 மணி நேரம்**

சொற்பொருள் விளக்கம் - பண்டைத் தமிழர் வாழ்வியல் - அகம் - களவு - கற்பு - குடும்பம் - விருந்தோம்பல் - உறவு முறைகள் - சடங்குகள் - நம்பிக்கைகள் - பொழுதுபோக்கு - புறம் - போர் முறைகள் - நடுகல் வழிபாடு - கொடைப்பண்பு.

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்

1. **தமிழர் நாகரிகமும் பண்பாடும்,** டாக்டர் அ. தட்சிணாமூர்த்தி (2001), ஐந்திணைப் பதிப்பகம்.
2. **தவறின்றித் தமிழ் எழுதுவோம்**, மா. நன்னன் (1999), ஏகம் பதிப்பகம்.
3. **தவறின்றித் தமிழ் எழுத** - மருதூர் அரங்கராசன் (2003), ஐந்திணைப் பதிப்பகம்.
4. **தமிழ் இலக்கிய வரலாறு**, வரதராசன் (2002), மு., புது தில்லி : சாகித்திய அக்காதெமி.
5. **புதிய தமிழ் இலக்கிய வரலாறு**, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம் (2007), சாகித்திய அகாடெமி.
6. **செம்மொழி தமிழின் சிறப்பியல்புகள்** - முனைவர் மறைமலை இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
7. **பாடநூல் தேடலுக்கான இணையம்** - https://archive.org/

24LHIN21 **HINDI -II**

L	T	P	O	C
2	0	0	1	2

(Prose, Official Letter Writing & Functional Hindi)

वर्ष I - सत्र I I (गद्य, पत्र लेखन & व्यावहारिक हिन्दी)

COURSE OBJECTIVES :

- To inculcate the human values, importance of patriotism and hard work
- To train students in functional Hindi
- To introduce the usage of Inscript keyboard

UNIT I : 'Boodee kaki" (Kahani) by Munshi Premchand 6hrs.
मुंशी प्रेमचंद कृत 'बूढी काकी' (कहानी)

UNIT II : 'Puraskar' (Kahani) by Jaishankar Prasad 6hrs.
जयशंकर प्रसाद कृत 'पुरस्कार' (कहानी)

UNIT III: 'Main Narak Se Bhol Raha Hun' (Vyangy) by Harishankar Parsayi, 6hrs.
हरिशंकर परसाई कृत 'मैं नरक से बोल रहा हूँ' (व्यंग्य)

UNIT IV: Functional Hindi- 50-Technical Words, 50-Designation & Department Names, Bhav Ek Bhasha Anek 6hrs.
व्यावहारिक हिन्दी- 50 - तकनीकि शब्द, 50 - पदनाम व विभागीय नाम, भाव एक भाषा अनेक

UNIT V : Functional Hindi-Letter Writing- 3 Official Letters. 6hrs.
Introduction to Inscript Keyboard
व्यावहारिक हिन्दी- पत्र लेखन - 3 औपचारिक पत्र,
इन्स्क्रिप्ट कीबोर्ड का परिचय

Total: 30hrs

COURSE OUTCOMES:

At the end of this course Students will be able to

CO1 Know to the human values

CO2 Know the importance of patriotism

CO3 Know the value of hardwork in human life

CO4 Journalise in Functional Hindi

CO5 Use in script keyboard

TEXT BOOKS:

1. Ed. Subhash chandar, Boodi Kaki by Premchand, Natioonal Book Trust, 2012.
2. Jaishankar Prasad, Pratinidhi Kahaniyan, Raj Kamal Prakashan, 2015.
3. Harishankar Parsai, Pratinidhi vyangy, Rajkamal, 2007.
4. Kendriya Hindi Prashikshan Sansthan, Parangat, Bharat Sarkar, 2015.

REFERENCE BOOKS:

1. Kendriya Hindi Sansthan, Banking Hindi Patyakram, 2012.

WEB RESOURCES:

1. Munshi Premchand, Manasarovar, 2007, http://gadyakosh.org
2. Jaishankar Prasad/ http://gadyakosh.org
3. Harishankar Parsai/ https://hindikahani.hindi-kavita.com
4. Prayojanmoolak Hindi:https://hi.mwikipedia.org
5. https://rajbhasha.gov.in/en/introduction

24LFRE21 **FRENCH - II**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

The lessons are being chosen:

1) To express his / her where abouts and to ask seek direction
2) To express obligation and restriction
3) To describe a place
4) To narrate and to question
5) To describe someone
6) To express his desire and to speak about the futur

UNITS:

1) C'EST OÙ **5**

L'impératif, Les articles contractés au, à la…, Le passé composé et l'accord du participe passé avec être.

2) N'OUBLIEZ PAS **5**

Le pronom relatif Qui, que, où, Les pronoms compléments indirects (me, te, lui, leur…)

3) BELLE VUE SUR LA MER -- **4**

Les adjectifs démonstratifs, Y- pronom complément.

4) UEL BEAU VOYAGE! **4**

Les verbes pronominaux, En- pronom complément.

5) OH ! JOLI **5**

L'imparfait, L'imparfait ou le passé composé.

6) Et après **7**

Le futur simple, Le subjonctif présent.

Total: 30 Hours

COURSE OUTCOMES:

CO1- The students would be able to express his/her where about and to ask direction

CO2- The students would be able to express obligation and restriction

CO3- The students would be able to describe a place

CO4- The students would be able to narrate and to question

CO5- The students would be able to describe someone

CO6- The students would be able to express his desire and to speak about the future

TEXT BOOKS:

1. LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau

REFERENCE BOOKS:

1. SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

L	T	P	O	C
2	0	0	1	2

24LENG21 **ENGLISH – II**

COURSE OBJECTIVES:

- To read and understand different types of prose, poetry, and fiction.
- To think critically about texts and express ideas clearly.
- To recognize and discuss key themes and styles in literary works.
- To learn and use grammar rules correctly in writing and speaking.
- To write more effectively by applying grammar and literary techniques.

Credit Hours

Unit I -Prose **6**

- If you are wrong, admit it- Dale Garnegie
- Words of Wisdom- Chetan Bhaghat

Unit II - Poetry **6**

- La Belle Dame Sans Merci - John Keats
- Ozymandias- P.B.Shelley

Unit III - Fiction **6**

- The School for Empathy - E.V. Lucas
- The Lamb to the Slaughter-Roald Dahl

Unit IV - Grammar **6**

- Types of sentences, Concord

Unit V - Grammar **6**

- Tenses, Voices

Total: 30 hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

CO1 Identify poetic expressions in the course of daily speech

CO2 Students will develop skills that enable them to communicate effectively in writing.

CO3 Students will develop skills that enable them to communicate effectively in writing.

CO4 Discriminate against different sensibilities in approaching life.

CO5 Strengthen the ability to solve life's problems, as highlighted in the selections.

REFERENCE BOOKS:

1. Anu Chitra (2012), Dr. M. Narayana Rao and Dr. B. G. Barki–Anu's Current English for communication.
2. V.Rajagopalan (2010), General English for competitive examinations by Mcgraw Hill Education

24CBCY21 OBJECT ORIENTED PROGRAMMING LANGUAGES

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

The course provides insight knowledge about object-oriented programming concepts and programming language in C++ and JAVA.

UNIT I OBJECT ORIENTED PROGRAMMING AND BASICS OF C++ 9

Principles of Object-Oriented Programming – Beginning with C++ - Applications of C++ - Tokens –Keywords- Expressions – Data Types – Storage Classes – Operators –Manipulators- Typecast Operator – Arrays –Strings-Control Structures – Operator Overloading -Functions in C++ - Function Prototyping – Call by REFERENCE BOOKS – Inline Functions –Recursion – Function Overloading – Friend and Virtual Function.

UNIT II CLASSES AND OBJECTS AND OPERATOR OVERLOADING 9

Introduction – Classes and Objects – Constructors –Parameterized Constructors – Copy Constructor – Dynamic Constructors – Destructors – Introduction to Operator Overloading – Overloading Unary Operator – Overloading Binary Operator – Type Conversions.

NIT III INHERITANCE AND POLYMORPHISM 9

Introduction- Defining Derived Classes - Inheritance – Types of Inheritance – Abstract Classes - Introduction to Virtual Functions - Pure Virtual Function-Polymorphism – Exception Handling.

UNIT IV JAVA INTRODUCTION, ARRAYS AND STRINGS 9

Java Evolution - Overview of Java Language – Constants – Variables – Data Types – Operators and Expressions – Class, Objects and Methods – Arrays, Strings and Vectors.

UNIT V PACKAGES AND MULTITHREADING 9

Introduction – Java API Packages – Creating Packages – Accessing a Package – Adding a Class to a package – Multithreading – Creating Threads - Life Cycle of a Thread – Thread Exceptions –Inter-Thread Communication.

Total: 45 Hours

COURSE OUTCOMES:

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

CO1: Develop an in-depth understanding of functional, logic, and object-oriented Programming Paradigms.

CO2: An understanding of the concepts of inheritance and polymorphism and ability to overload Operators in C++.

CO3: An understanding of the difference between function overloading and function overriding.

CO4: An ability to write object-oriented programs of moderate complexity in Java. An understanding the concepts of class, objects and methods in java and strings.

CO5: An ability to create packages, accessing a package and adding a class to package and threads.

TEXT BOOKS:

1. Paul Deitel and Harvey Deitel (2015), "C++ How to Program", Nineth Edition, Prentice Hall.
2. Herbert Schildt (2023), "Java The complete REFERENCE BOOKS", 13th Edition, McGraw Hill Professional.

REFERENCE BOOKS:

1. Balaguru
2. samy E.(2012) "Object oriented programming using C++ and JAVA", First Edition, Tata McGraw–Hill Education.

L	T	P	O	C
3	0	0	2	3

24CBCY22 OPERATING SYSTEMS AND SECURITY

COURSE OBJECTIVES:

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

UNIT I OPERATING SYSTEM OVERVIEW 9

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

UNIT II PROCESS MANAGEMENT 9

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

UNIT III MEMORY MANAGEMENT AND FILE SYSTEMS 9

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

UNIT IV SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS 9

Security Goals — Trust and Threat Model — Access Control Fundamentals — Protection

System — REFERENCE BOOKS Monitor — Secure Operating System Definition — Assessment Criteria — Information Flow — Information Flow Secrecy Models — Denning's Lattice Model — Bell LaPadula Model — Information Flow Integrity Models — Biba Integrity Model — Low-Water Mark Integrity — Clark- Wilson Integrity.

UNIT V SECURITY IN OPERATING SYSTEMS 9

UNIX Security — UNIX Protection System — UNIX Authorization — UNIX Security Analysis — UNIX Vulnerabilities — Windows Security — Windows Protection System — Windows Authorization — Windows Security Analysis — Windows Vulnerabilities — Address Space Layout Randomizations — Retrofitting Security into a Commercial Operating System — Introduction to Security Kernels.

Total: 45 Hours

COURSE OUTCOMES:

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

CO1: To gain understanding on the concepts of operating systems.

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

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

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

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

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne (2021), "Operating System Concepts", John Wiley & Sons, Inc., 10th Edition.
2. William Stallings (2017), "Operating Systems — Internals and Design Principles", 9th Edition, Pearson
3. Trent Jaeger (2008), Operating System Security, Morgan & Claypool Publishers series.
4. Morrie Gasser (1988), "Building A Secure Computer System", Van Nostrand Reinhold, New York.
5. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies (2015), "Security in Computing", Fifth Edition, Prentice Hall, New Delhi.

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REFERENCE BOOKS:

1. Michael Palmer, (2008) ,"Guide to Operating Systems Security", Course Technology — Cengage Learning, New Delhi.
2. Cliff Wang, Springer (2012), "Introduction to Hardware, Security and Trust", book by Mohammad Tehrani poor.
3. Gary McGraw, (2005), "Software Security: Building Security In", Addison Wesley software security series.

24PBCY21 OBJECT ORIENTED PROGRAMMING LANGUAGES LAB

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

The purpose of this course is to introduce to students to the field of programming using C++ and Java. Be able to use the Java SDK environment to create, debug and run simple Java programs.

LIST OF PROGRAMS:

1. Design C++ classes with static members, methods with default arguments.
2. Implement complex number class with necessary operator overloading and type conversions such as integer to complex, double to complex, complex to double etc using C++.
3. Manage bank account using inheritance concept using C++
4. Design stack and queue classes with necessary exception handling using C++.
5. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc
6. Programs illustrating various data types in java.
7. Programs to implement method overloading in java.
8. Programs illustrating the implementation of various forms of inheritance (single, hierarchical, multilevel).
9. Programs to implement polymorphism and method overriding in java.
10. Programs implementing exception handling.
11. Programs to illustrate interfaces in java.
12. Programs to create package in java

Total: 15 Hours

COURSE OUTCOMES:

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

CO1: Ability to have an in-depth knowledge of object-oriented Programming paradigm

CO2: To be able to apply various object-oriented features using C++

CO3: Understand the basics of object-oriented programming using JAVA.

CO4: Develop Java Programs using inheritance and Exception handling.

CO5: Learn and develop Java programs for Interfaces and to create packages.

REFERENCE BOOKS:

1. Herbert Schildt (2023), “Java The complete REFERENCE BOOKS”, 13th Edition, McGraw Hill Professional.
2. Bloch, Joshua (2018), "Effective Java: Programming Language Guide" (Third ed.). Addison-Wesley, ISBN 978-0134685991.
3. Pecinovsky, Rudolf (2013). OOP – Learn Object Oriented Thinking & Programming. Bruckner Publishing, ISBN 978-80-904661-8-0.

WEB RESOURCES:

1. https://www.sanfoundry.com/cpp-programs/
2. https://www.javatpoint.com/cpp-programs
3. https://www.programiz.com/cpp-programming/examples

24PBCY22 **OPERATING SYSTEMS AND SECURITY LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

To provide an understanding of the design aspects of operating system concepts. Introduce basic Linux commands, system call interface for process management, interprocess communication and I/O in Linux. Using tools (SNORT) for secure Operating System.

LIST OF PROGRAMS:

1. Basics of Linux commands, Understand and practice Linux permissions, special permissions and authentication (various options of CHMOD, SETUID, SETGID)
2. Write programs using the following system calls of Linux operating system
   a)FORK, EXEC, GETPID, EXIT, WAIT, CLOSE, STAT, OPENDIR, READDIR
3. Write programs to implement the various CPU Scheduling Algorithms
4. Bankers Algorithm for Deadlock Detection &Avoidance
5. Implementation of the following Page Replacement Algorithms
   a) FIFO b) LRU c) LFU
6. Study of the features of firewall in providing network security and to set Firewall Security in windows.
7. Oracle Virtual Box installation, Kali Linux and Windows operating system installation into Virtual Box.
8. Perform network traffic analysis using Wireshark.
9. Investigate Buffer overflow vulnerabilities.
10. Experiment on password cracking with Windows & Linux.
11. Investigate ARP poisoning.
12. Demonstrate any Intrusion Detection System Tool (SNORT or any other Tool)

Total : 15 Hours

COURSE OUTCOMES:

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

CO1: Understand basis Linux commands, permissions and Authentications

CO2: Explore various system calls like FORK, EXEC, GETPID, etc.

CO3: Write Programs to implement CPU Scheduling, Banker's algorithms and Page replacement Algorithms.

CO4: Apply various tools to perform network analysis and hacking.

CO5: Learn Intrusion Detection Systems and develop applications.

REFERENCE BOOKS:

1. Michael Kerrisk (2010), "The Linux Programming Interface: A Linux and UNIX System Programming".
2. Jason Cannon (2013), "Linux for Beginners: An Introduction to the Linux Operating System and Command Line".

WEB RESOURCES:

1. https://www.tutorialspoint.com/unix/index.htm
2. https://www.javatpoint.com/linux-tutorial

SEMESTER III

24LTAM31 **தமிழ்மொழிப்பாடம்-III**

L	T	P	O	C
2	0	0	1	2

மொழிவரலாறு – சங்க இலக்கியம் – அற இலக்கியம் – மொழித்திறன்

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், தற்கால தமிழ் இலக்கிய வகைமைகளான மரபுக்கவிதை, புதுக்கவிதை, உரைநடை ஆகியவற்றை அறிமுகப்படுத்துதல், தமிழர்தம் வாழ்வியல் நெறிகளையும் பண்பாட்டுச் செழுமைகளையும் இன்றைய தலைமுறையினர் அறியச் செய்தல், மாணவர்களுக்குத் தமிழைத் தவறின்றி எழுதுவதற்குத் தேவையான பயிற்சி அளித்து அவர்களின் மொழித்திறனை மேம்படுத்துதல், செய்யுளின் நலத்தைப் பாராட்டும் முறைமையை அறியச் செய்து அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களுக்கு வேலைவாய்ப்பை உருவாக்குவதும் இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு- 1: தமிழ் மொழி வரலாறு **8 மணி நேரம்**

மொழிக்குடும்பம் - இந்திய மொழிக்குடும்பங்கள் - இந்திய ஆட்சி மொழிகள் - திராவிட மொழிக்குடும்பங்கள் - திராவிட மொழிகளின் வகைகள் –திராவிட மொழிகளின் சிறப்புகள் - திராவிட மொழிகளின் வழங்கிடங்கள் - திராவிட மொழிகளுள் தமிழின் இடம் - தமிழ்மொழியின் சிறப்புகள் - தமிழ் பிறமொழித் தொடர்புகள்.

அலகு -2 **8 மணி நேரம்**

புறநானூறு- பாடல் எண்: , 182, 183, – இரண்டு பாடல்கள்.

குறுந்தொகை- பாடல் எண்: 2, 167, - இரண்டு பாடல்கள்

பரிபாடல் - முருகன். வையை - இரண்டு பாடல்கள்

அலகு-3அறஇலக்கியங்கள் **8 மணிநேரம்**

திருக்குறள்- வான்சிறப்பு (அறம்), பெருமை (பொருள்), பிரிவாற்றாமை (இன்பம்),. மூன்று அதிகாரங்கள் முழுமையும்

1. நாலடியார் - இரண்டு பாடல்கள். (2, 3)
2. மூதுரை - இரண்டு பாடல்கள். (2, 8)

அலகு 4 மொழி **7 மணி நேரம்**

பிழை நீக்கி எழுதுதல் - ஒற்றுப்பிழை நீக்கி எழுதுதல் - தொடர்பிழை

நீக்கி எழுதுதல் - ஒற்று மிகும் இடங்கள் - ஒற்று மிகா இடங்கள் - பிற மொழிச் சொற்களை நீக்கி எழுதுதல் – பயிற்சிகள்.

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்

1. **தமிழர் நாகரிகமும் பண்பாடும்,** டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
2. **தவறின்றித் தமிழ் எழுதுவோம்**, மா. நன்னன், ஏகம் பதிப்பகம், 1999.
3. **தவறின்றித் தமிழ் எழுத** - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
4. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காதெமி, 2002.
5. **புதிய தமிழ் இலக்கிய வரலாறு**, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.
6. **செம்மொழி தமிழின் சிறப்பியல்புகள்** - முனைவர் மறைமலை இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
7. **பாடநூல் தேடலுக்கான இணையம் -** https://archive.org/

24LHIN31 HINDI -III

L	T	P	O	C
2	0	0	1	2

Ancient & Medival Poetry, Hindi translation & Advertisement)

वर्ष II–सत्र III (आदि & मध्य कालीन पद्य, हिन्दी अनुवाद & विज्ञापन)

COURSE OBJECTIVES :

- To enrich the knowledge of students about through Thirukkural.
- To enable them to learn life values through ancient and medievial poems of Hindi Literature.
- To develop translation and advertisements skills in Hindi

UNIT I : 'Thirukkural'- 5 Kural-by Thiruvalluvar & Amir Khusro-5 Paheliyan 6hrs.
तिरुवल्लुवर कृत तिरुक्कुरल - 5, अमीर खुसरो कृत पहेलियाँ - 5

UNIT II: Kabir Ke Dohe,-5 6hrs.
कबीर के दोहे - 5

UNIT III: Tulsidas Ke Pad-2 & SurdasKe Pad-2 6hrs.
तुलसीदास के पद - 2 & सूरदास के पद - 2

UNIT IV: Functional Hindi- Introduction to Translation (Meaning, Definition &Types) & Exercise passages – 5 6hrs.
व्यावहारिक हिन्दी - अनुवाद का परिचय (अर्थ, परिभाषा व प्रकार) & 5 - अभ्यास अनुछेद

.

UNIT V: Advertisement –Introduction (Meaning, Definition & Types) & Model Advertisement - 4 6hrs.
विज्ञापन का परिचय (अर्थ, परिभाषा व प्रकार) & 4 - नमूना विज्ञापन

Total: 30hrs

COURSE OUTCOMES:

At the end of this course Students will

CO1 Know the valuable messages in social responsibilities

CO2 & CO3 Know the life values

CO4 Gain knowledge of translation in functional Hindi

CO5 Gain knowledge about advertisement skills in Hindi

TEXT BOOKS:

1. Thirukkural, Bharatiya Gyanpeet, 2014.
2. Amir Khusro Ki Paheliyan, Prakrit Bharati Acadamy, 2006.
3. Amar Prakash, Kahir Dohavali, Mahamaya Publication, 2020.
4. Tulsidas, Dohavali, Geeta Press, Gorakhpur.
5. Vagdev, Surdas Ke Padavali, Prabhat Prakashan, 2011.

REFERENCE BOOKS:

1. Rachana Vyas, Amir Khusro Ki Paheliyan, Lokoday Prakashan Pvt. Ltd., 2022.
2. Kendriya Hindi Sansthan, Banking Hindi Patyakram, 2012.
3. Kendriya Hindi Prashikshan Sansthan, Parangat, Bharat Sarkar, 2015.

WEB RESOURCES:

1. Thirukkural hindi translation by Venkata Krishnan
2. Ameer khusro ki paheliyan - https://www.hktbharat.com
3. Kabir ke Dohe - Kabir granthavali , Surhranthavali-http://kavitakosh.org
4. Tulsidas ke pad - http://kavitakosh.org

24LFRE31 **FRENCH -III**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

The lessons are being chosen:

1) to express certainty and uncertainty
2) to express one's desire to do something
3) to express one's willingness and unwillingness to do something
4) to express one's joy and sorrow
5) to express one's fear, concern and astonishment
6) to express one's anger and regrets

UNITS

1) Très drôle le passe recent, passe compose et l'imparfait 6 hours.
2) Vous avez dit culture l'interrogation et le subjonctif. 5 hours
3) Envie d'ailleurs les verbes aller/ retourner, venir/ revenir, ne...pas...ni, ne…ni…ni. 4 hours
4) Voila l'été le comparatif, superlatif et l'accord du participe passe avec avoir. 7 hours
5) Terre inconnue le plus-que parfait 3 hours
6) Vivement dimanche le pronom en et y, le subjonctif et les conjugaisons irrégulières. 5 hours

Total: 30hrs

COURSE OUTCOMES:

At the end of this course Students will be able to

CO1 The students would be able to express certainty and uncertainty

CO2 The students would be able to express one's desire to do something

CO3 The students would be able to express one's willingness and unwillingness to do Something.

CO4 The students would be able to express one's joy and sorrow

CO5 The students would be able to express one's fear, concern and astonishment

CO6 The students would be able to express one's anger and regrets

TEXT BOOKS:

1. LATITUDES 1 (A2/B1) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau

REFERENCE BOOKS:

1. SAISON A2 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

24LENG31 **ENGLISH III**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To enhance reading comprehension skills for understanding complex texts in competitive exams.
- To develop vocabulary and language proficiency to tackle verbal reasoning sections effectively.
- To improve grammar and writing skills for precise and coherent expression in written exams.
- To practice critical thinking and analytical reasoning abilities required for exam questions.
- To familiarize students with exam formats, strategies, and time management techniques for success in competitive exams.

Credit Hours

Unit I -Vocabulary 12

Homophones, Homonyms, Note-taking, Paraphrasing

Unit II - Comprehension **12**

Reading comprehension, Critical reading, Cloze test

Unit III - Grammar 12

Idioms and Phrases, Question tag, Verbal phrases, Prepositions

Unit IV - Grammar 12

Voices, Direct & Indirect speech, Simple, Compound, Complex

Unit V - Academic Writing 12

Precis writing, Report writing

Total : 60 hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

CO-1 Students imbibe the rules of language unconsciously and tune in to deduce language structure and usage.

CO-2 Students develop their abilities as critical readers and writers.

CO-3 Students decipher the mechanism of language and use it for success in competitive examinations and job-related speaking and writing tasks.

REFERENCE BOOKS:

1. General English for competitive examinations by V. Rajagopalan (McGraw Hill Education) -2010.
2. Technical Communication – Principles and Practices By Meenakshi Raman & Sangeeta
3. K. Sharma, Oxford Univ. Press, 2016, New Delhi.

24EVS031 **ENVIRONMENTAL STUDIES**

COURSE OBJECTIVE:

To inculcate the importance of environmental pollution, preservation of nature and environmental management for human welfare.

UNIT-I HUMAN COMMUNITIES AND THE ENVIRONMENT 9

The man-environment interaction: Humans as hunter-gatherers; Mastery of fire; Origin of agriculture; Emergence of city-states; Great ancient civilizations and the environment, Indic Knowledge and Culture of sustainability; Middle Ages and Renaissance; Industrial revolution and its impact on the environment; Environmental Ethics and emergence of environmentalism: Anthropocentric and eco-centric perspectives (Major thinkers); The Club of Rome- Limits to Growth; UN Conference on Human Environment 1972; World Commission on Environment and Development and the concept of sustainable development; Rio Summit and subsequent international efforts.

UNIT II NATURAL RESOURCES AND SUSTAINABLE DEVELOPMENT 9

Renewable and non-renewable resources - Natural resources and associated problems. a) Forest resources b) Water resources c) Mineral resources d) Food resources e) Energy resources: f) Land resources; Role of an individual in conservation of natural resources- Equitable use of resources for sustainable lifestyles. Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs.

UNIT-III ECOSYSTEM AND BIODIVERSITY 9

Ecosystems and ecosystem services: Major ecosystem types in India and their basic characteristics-forests, wetlands, grasslands, agriculture, coastal and marine; Ecosystem services-classification and their significance. Biodiversity and its distribution: Biodiversity as a natural resource; Levels and types of biodiversity; Biodiversity in India and the world; Biodiversity hotspots; Species and ecosystem threat categories. Threats to biodiversity and ecosystems: Land use and land cover change; Commercial exploitation of species; Invasive species; Fire, disasters and climate change. Major conservation policies: in-situ and ex-situ conservation approaches;

UNIT-IV ENVIRONMENTAL POLLUTION AND HEALTH 9

Understanding pollution: Production processes and generation of wastes; Assimilative capacity

of the environment; Definition of pollution; Point sources and non-point sources of pollution; 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.

UNIT-V ENVIRONMENTAL TREATIES AND LEGISLATION **9**

Major International Environmental Agreements: Convention on Biological Diversity (CBD); Cartagena Protocol on Biosafety; Nagoya Protocol on Access and Benefit-sharing; Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); Ramsar Convention on Wetlands of International Importance; United Nations Convention to Combat Desertification (UNCCD); Vienna Convention for the Protection of the Ozone Layer; Environmental laws: 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.

Total: 45 hours

COURSE OUTCOMES:

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

CO1: Gain insights into the international efforts to safeguard the Earth's environment and resources.

CO2: Understand the concept of natural resources; identify types of natural resources, their distribution and use with special reference to India.

CO3: Understand the concepts of ecosystems, biodiversity and conservation.

CO4: Sensitize themselves to adverse health impacts of pollution.

CO5: Understand the sectoral effects on the local, regional, and global environmental issues

TEXT BOOKS:

1. Fisher, Michael H. (2018) An Environmental History of India- From Earliest Times to the Twenty-First Century, Cambridge University Press.
2. William P. Cunningham and Mary Ann Cunningham, Environmental Science: A Global Concern 14th Edition, 2021.
3. Sinha, N. (2020) Wild and Wilful. Harper Collins, India.
4. Climate change: Science and politics (2021), Centre science and Environment, New Delhi,

REFERENCE BOOKS

1. Daniel B. Botkin and Edward A. Keller, Environmental Science: Earth as a Living Planet, 9th Edition, New Age International 2022.
2. Jadhav H and Bhosale VM, Environmental Protection and Laws. Himalaya Publishing House, Delhi 284pgs 2023.

WEB LINK AND WE SOURCE:

1. https://easyengineering.net/ge6351-environmental-science-and/
2. https://learnengineering.in/ge8291-environmental-science-and-engineering
3. https://cpcb.nic.in/ standards/

24CBCY31 PROBLEM SOLVING USING PYTHON PROGRAMMING

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES

The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. It is an interpreted language, with a rich programming environment. Student interested in using computation to enhance their problem-solving abilities.

UNIT I INTRODUCTION 3

History and Application areas of Python; Structure of Python Program; Identifiers and Keywords; Operators and Precedence; Basic Data Types and type conversion; Statements and expressions; Input/Output statements. Strings: Creating and Storing Strings, Built-in functions for strings; string operators, String slicing and joining; Formatting Strings. Control Flow statements: Conditional Flow statements; Loop Control Statements; Nested control Flow; continue and break statements, continue, Pass and exit.

UNIT II FUNCTIONS 3

Built-In Functions, Function Definition and call; Scope and Lifetime of Variables, Default Parameters, Command Line Arguments; Lambda Functions; Assert statement; Importing User defined module; Mutable and Immutable objects: Lists, Tuples and Dictionaries; Commonly used Functions on Lists, Tuples and Dictionaries. Passing Lists, tuples and Dictionaries as arguments to functions. Using Math and Numpy module for list of integers and arrays.

UNIT III FILES & DATABASES IN PYTHON 3

Types of Files; Creating, Reading and writing on Text and Binary Files; The Pickle Module, Reading and Writing CSV Files. Reading and writing of csv and JSON files. Exception Handling: Try-except-else-finally block, raise statement, hierarchy of exceptions, adding exceptions. Using Databases in Python: Python MySQL Database Access Install the MySQLdb and other Packages Create Database Connection CREATE, INSERT, READ Operation DML and DDL Operation with Databases

UNIT IV DATA VISUALIZATION 3

Plotting various 2D and 3D graphics; Histogram; Pi charts; Sine and cosine curves. Exploratory Data Analysis: Statistics and Probability using Numpy Data Manipulation and Exploratory Data Analysis with Pandas Matplotlib and Seaborn libraries for Visualization Web Programming using Flask, GUI programming TCL TK

UNIT V OBJECT ORIENTED PROGRAMMING USING PYTHON 3

Need for Static, Static members, Static functions Need for Encapsulation and Abstraction, Private Attributes, Getter, and Setter Methods– Python Implementation Inheritance: Need for Inheritance, Kinds of Inheritance Polymorphism Abstract methods, Overloading and Overriding

Total : 45 Hours

COURSE OUTCOMES:

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

CO1: Understand Python programming basics, syntax, control flow, strings, and I/O operations.

CO2: Develop functions, use built-in modules, apply mutable and immutable data structures for problem solving.

CO3: Perform file operations, handle exceptions, and connect Python with databases for CRUD operations

CO4: Apply Python libraries for data visualization, exploratory data analysis, and build simple web applications and GUIs.

CO-5: Demonstrate Object-Oriented Programming concepts like encapsulation, inheritance, and polymorphism in Python.

TEXT BOOKS:

1. Nagaraju Y. Venkatesh(2021), Introduction to Python Programming.
2. Jeeva Jose (2023), Introduction to Computing & Problem Solving with Python.
3. Sheetal Taneja & Naveen Kumar (2017), Python Programming: A Modular Approach with Graphics, Database, Mobile and Web Applications.

REFERENCE BOOKS:

1. Allen Downey (2015), Think Python, 2nd Edition.
2. Bob Dowling, [n.d.], An Introduction to Python for Absolute Beginners.
3. John Guttag (2016), Introduction to Computation and Programming using Python, 2nd Edition.

WEB RESOURCES:

1. https://www.learnpython.org/
2. https://www.w3schools.com/python/default.asp

24CBCY32 **ADVANCED DATABASE SYSTEMS**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

This course aims to give students in depth information about system implementation techniques, data storage, representing data elements, database system architecture, the system catalog, query processing and optimization, transaction processing concepts, concurrency control techniques, distributed databases and client server architecture, advanced database concepts, and emerging technologies and applications.

UNIT I DATABASE SYSTEM 3

Introduction to Database System Database and Users: Introduction (Basic Concepts: Data, Database, Database systems, Database Management Systems), Characteristics of Database Approach, Actors on Scene, Workers behind the Scene, Advantages of using the DBMS approach Database System Concepts and Architecture: Data Models, Schemas, Instances, the three schema architectures and data independence, Database Languages and interfaces, Database System environment, Centralized and client / Server Architecture for DBMS, Classifications of Database Management Systems.

UNIT II ER DIAGRAMS 3

Entity Relationship Diagram Using high level conceptual data models for database design (Design Phases of database design), Entity types, Entity Sets, Attributes and keys, Relationship Types, Relationship sets, Roles and structural constraints, Weak entity types, Refining the ER diagram for company Database, Entity Relationship Diagram naming conventions Design issues, Example of other Notation: UML class diagram, Relationship types of degree higher than 2 Subclasses, Super Classes, Inheritance Specialization and Generalization Relational Database design by ER and EER.

UNIT III RELATIONAL DATABASES 3

Informal Design Guidelines for Relational Schema, Functional Dependencies, Normal Forms based on Primary keys, General definitions of 1NF, 2NF and 3NF, Boyce-Codd Normal Forms (BCNF), Multi-valued Dependency and Fourth Normal Form. Relational Model concepts: Relational Model concepts, Relational Model constraints and Relational Database Schemas

UNIT IV SQL & PL/SQL COMMANDS 3

SQL Concepts: Basics of SQL, DDL, DML, DCL, structure – creation, alteration, defining

constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions– numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Save point. PL/SQL Concepts PL/SQL Block, Stored Procedures, Functions and Packages (Except Cursor Management)

UNIT V MySQL OPERATIONS 3

MySQL - Connecting to and disconnecting from the server-Creating and selecting a Database-Creating a Table-Loading data into a table-Retrieving information from a table-Using MySQL in Batch Mode Grouping-Joins-Arithmetic and string functions-Advanced Functions-SET Operators-Creating Complex Queries-DML Operations-Insert, Update & Delete-TSQL

Total: 45Hours

COURSE OUTCOMES:

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

CO1: Ability to define a problem at the view level & ability to understand the physical structure of the database to handle data.

CO2: Ability to normalize the database & understand the internal data structure.

CO3: Students would clearly understand the transaction system & could extract data efficiently.

CO4: Make backup copies and recover the state of the DB after a system failure.

CO5: Define links between databases on different nodes and work with the multiple databases.

TEXT BOOKS:

1. Date C. J (2003)., “An Introduction to Database Systems”, Addison Wesley Longman, 8th Edition.
2. Catell, R.G.G., Barry, D.K., Berler, M., et al (2000), “The Object Data Standard: ODMG 3.0”, Morgan Kaufmann.
3. Silberschatz A., Korth H., and Sudarshan S (2010)., “Database System Concepts”, McGraw- Hill, 6th Edition.

REFERENCE BOOKS:

1. Charles F. Goldfarb, Paul Prescod (2004), “The XML Handbook, Prentice Hall”, 5th Edition.
2. Thomas M. Connolly, Carolyn Begg (2012), “Database Systems: Practical approach to Design, Implementation and Management”, Pearson Education Limited, 6th edition.

24PBCY31 PROBLEM SOLVING USING PYTHON PROGRAMMING LAB

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

To implement Python programs with conditionals and loops. Also represent compound data using Python lists, tuples, dictionaries and read and write data from/to files in Python.

LIST OF PROGRAMS:

1. Find the square root of a number (Newton's method), Exponentiation (power of a number)
2. Find the maximum of a list of numbers, First n prime numbers
3. Write a program to implement Linear Congruential Algorithm to generate 5 pseudo random numbers.
4. Write a program to implement Fermat Primality Testing Algorithm, Rabin-Miller Primality Testing Algorithm
5. Write a program to implement the Euclid Algorithm to generate the GCD of an array of 10 integers in C.
6. Linear search and Binary search
7. Selection sort, Insertion sort
8. Multiply matrices
9. Programs that take command line arguments (word count)
10. Find the most frequent words in a text read from a file
11. Simulate elliptical orbits in Pygame
12. Simulate bouncing ball using Pygame

COURSES OUTCOMES:

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

CO1: Write Python programs using if-else conditions and loops to solve problems, such as calculating square roots and exponentiation.

CO2: Use lists, tuples, and dictionaries to store and manipulate data and will learn to read and write data to files in Python.

CO3: Implement and test basic algorithms like searching (linear and binary search) and sorting (selection and insertion sort) in Python.

CO4: Solve math problems like finding prime numbers and matrix multiplication, and create simple simulations like elliptical orbits and a bouncing ball using Pygame.

CO5: Write Python programs that handle command-line inputs, perform word count, and find the most frequent words in a file.

TEXT BOOKS:

1. Nagaraju Y. Venkatesh(2021), Introduction to Python Programming.
2. Jeeva Jose (2023), Introduction to Computing & Problem Solving with Python.
3. Sheetal Taneja & Naveen Kumar (2017), Python Programming: A Modular Approach with
4. Graphics, Database, Mobile and Web Applications.

REFERENCE BOOKS:

1. Allen Downey (2015), Think Python, 2nd Edition.
2. Bob Dowling, [n.d.], An Introduction to Python for Absolute Beginners.
3. John Guttag (2016), Introduction to Computation and Programming using Python, 2nd Edition.

WEB RESOURCES:

1. https://www.learnpython.org/
2. https://www.w3schools.com/python/default.asp

24PBCY32 **ADVANCED DATABASE SYSTEMS LAB**

L	T	P	O	C
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COURSE OBJECTIVES:

The student learns to work in PL/SQL Cursors, Stored Procedures, Collections, Transactions and Error Handling. The students will also able to implement Timestamp ordering Protocol and Deadlock Avoidance concepts.

1. Learning basic DDL, DML, DCL and TCL commands
2. Working with dual table.
3. PL/SQL-Data types, control structures.
4. Creating Stored Procedures with PL/ SQL.
5. Error handling in PL/ SQL.
6. Cursor Management in PL/ SQL.
7. Writing Programs on Packages & triggers.
8. PL/SQL – Collections
9. PL/SQL- Transactions
10. Embedding PL/SQL in high level language.
11. Implement Timestamp Ordering Protocol in PL/SQL.
12. Implement Deadlock Avoidance in PL/SQL.

COURSE OUTCOMES:

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

CO1: Ability to define a problem at the view level & ability to understand the physical structure of the database to handle data.

CO2: Ability to normalize the database & understand the internal data structure.

CO3: Students would clearly understand the transaction system & could extract data efficiently.

CO4: Make backup copies and recover the state of the DB after a system failure.

CO5: Define links between databases on different nodes and work with the multiple databases.

TEXT BOOKS:

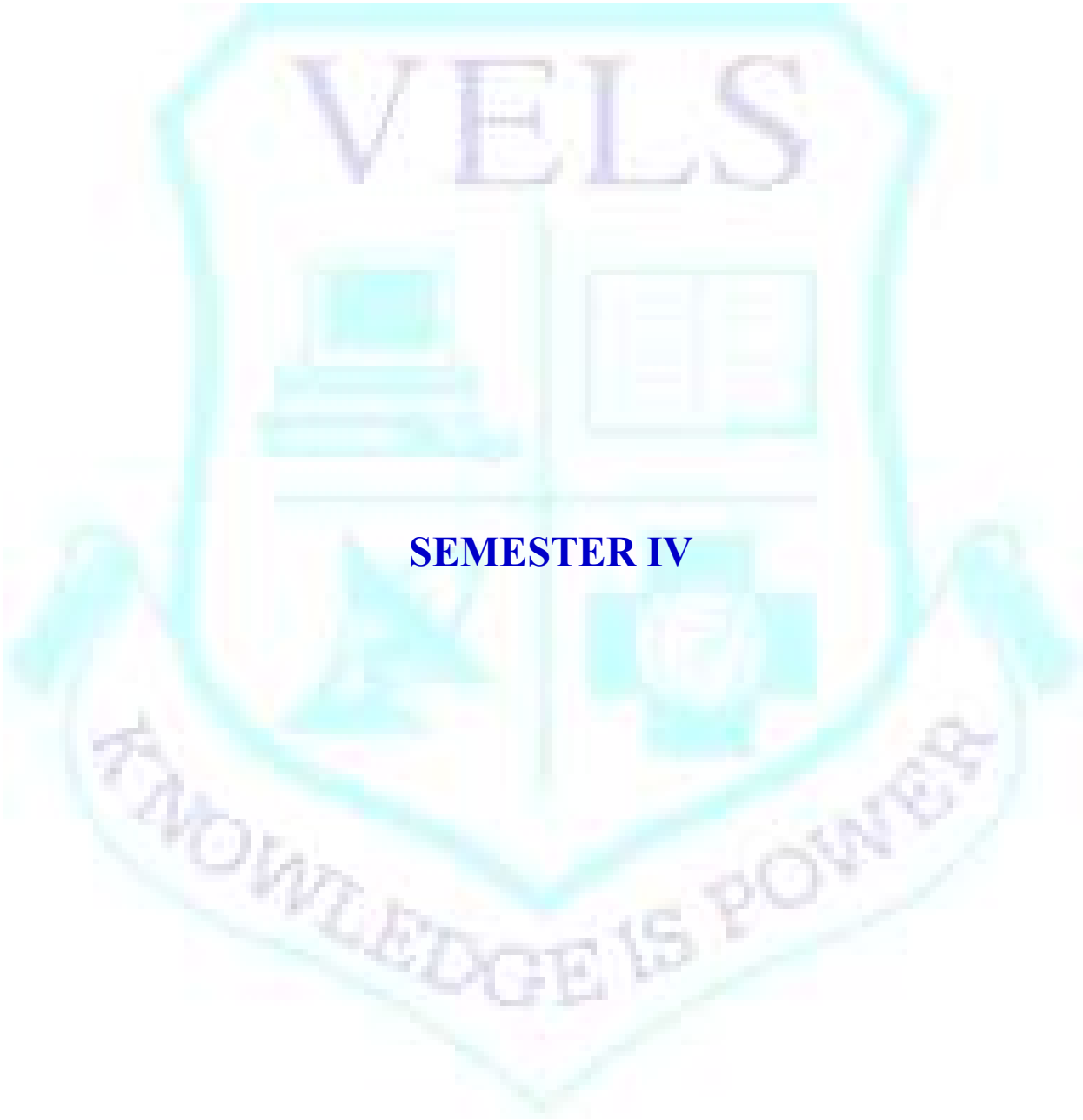
1. Date C. J (2003)., "An Introduction to Database Systems", Addison Wesley Longman, 8th Edition.
2. Catell, R.G.G., Barry, D.K., Berler, M., et al (2000), "The Object Data Standard:

ODMG 3.0", Morgan Kaufmann.

3. Silberschatz A., Korth H., and Sudarshan S (2010)., "Database System Concepts", McGraw- Hill, 6th Edition.

REFERENCE BOOKS:

1. Charles F. Goldfarb, Paul Prescod (2004), "The XML Handbook, Prentice Hall", 5th Edition.
2. Thomas M. Connolly, Carolyn Begg (2012), "Database Systems: Practical approach to Design, Implementation and Management", Pearson Education Limited, 6th edition.



SEMESTER IV

24LTAM41 தமிழ்மொழிப்பாடம்-IV

L	T	P	O	C
2	0	0	1	2

மரபுக்கவிதை,புதுக்கவிதை,ஊடகத்தமிழ்,கணினித்தமிழ்

பாடத்திட்ட நோக்கம்:

தமிழர்தம் தொன்மைச் சிறப்பையும், பண்பாட்டுச் செழுமையையும் உலகிற்குப் பறைசாற்றும் சங்க இலக்கியங்களான எட்டுத்தொகை, பத்துப்பாட்டு நூல்களை அறியச் செய்தல், அதன்வழி பண்டைத் தமிழரின் விழுமியங்களை எடுத்துரைத்தல், இலக்கால இலக்கிய வகைமையான நாடக இலக்கியத்தை அறியச் செய்தல், ஊடகங்களில் தமிழின் பயன்பாடு, கணினியில் தமிழ்ப்பயன்பாடு என்பனவற்றை மாணவர்களுக்கு கற்றுக்கொடுத்தல், மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்தல் என்பன இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1: மரபுக்கவிதை 8 மணி நேரம்

1. பாரதியார் - பாரத தேசம் என்னும் தலைப்பில் ஆறு பாடல்கள்.
2. (பாடல் எண்கள் 1, 6, 7, 9, 12, 13)
3. பாரதிதாசன் – தமிழுக்கும் அமுதென்று பேர் என்னும் தலைப்பிலான கவிதை.
4. தேசிக விநாயகம் பிள்ளை - உடல் நலம் பேணல் என்னும் தலைப்பிலான கவிதை
5. முடியரசன் - காவியப் பாவை – "புண்படுமா" என்னும் கவிதை.

அலகு 2: புதுக்கவிதை 8 மணி நேரம்

1. நா. காமராசன் - *கறுப்பு மலர்கள்* தொகுப்பில் *காகிதப்பூக்கள்* என்னும் தலைப்பிலான கவிதை.
2. அப்துல் ரகுமான் - *ஆலாபனை* தொகுப்பில் *போட்டி* என்னும் தலைப்பிலான கவிதை
3. ஆண்டாள் பிரியதர்ஷினி – *முத்தங்கள் தீர்ந்துவிட்டன* தொகுப்பில் *'இங்கே வரும் போது'* என்னும் தலைப்பிலான கவிதை

அலகு 3 :ஊடகத் தமிழ் 7 மணி நேரம்

இதழியல் - ஊடக வகைகள் - தலையங்கம்- நிகழ்ச்சியை செய்தியாக மாற்றுதல்- கருத்துப் பரிமாற்றம் நாடகம், திரைப்படம்,- வானொலி- தொலைக்காட்சி- மொழி நடையின் தன்மை

அலகு 4 : கணினித் தமிழ் **7 மணி நேரம்**

கணினித் தமிழ்: கணினித் தமிழின் அடிப்படையும் பயன்பாடும் - கணிப்பொறியின் வரலாறும் வளர்ச்சியும், கணினியும் தமிழும், விசைப்பலகை (Keyboard) - எழுத்துருக்கள் (Fonts) - தமிழைத் தட்டச்சு செய்ய உதவும் மென்பொருள்கள், தமிழைத் தட்டச்சு செய்யும் முறைகள் - தமிழ்த் தட்டச்சுப் பயிற்சி - இணையமும் தமிழ்ப் பயன்பாடும் - தேடுபொறி (Search) - வலைப்பூ (Blog), மின்னூலகம் (Online e-Library), - மின்னகராதி(e-Dictionary), - மின் செய்தித்தாள் - e-Paper, - இணையவழித் தமிழ்க் கற்றலும்-கற்பித்தலும் - மின்வழிக் கற்றல் - e Learning.

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்

1. **தமிழர் நாகரிகமும் பண்பாடும்,** டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
2. **தவறின்றித் தமிழ் எழுதுவோம்**, மா. நன்னன், ஏகம் பதிப்பகம், 1999.
3. **தவறின்றித் தமிழ் எழுத** - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
4. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காதெமி, 2002.
5. **புதிய தமிழ் இலக்கிய வரலாறு**, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.
6. **செம்மொழி தமிழின் சிறப்பியல்புகள்** - முனைவர் மறைமலை இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
7. **பாடநூல் தேடலுக்கான இணையம் -** https://archive.org/

24LHIN41 **HINDI-IV**

L	T	P	O	C
2	0	0	1	2

Modern Poetry, Official Language & Stage Management)

वर्ष II – सत्र IV (नई कविता, राज भाषा & मंच संचालन)

COURSE OBJECTIVES :

- To develop interest in various style of Modern and Contemporary Hindi Poetry
- To enable them to know about the Official Language Hindi
- To enable them to converse in Hindi

UNIT I : Bharatendu Harishchandra ki Mukhariyan-5. 6hrs.
भारतेन्दु हरिश्चंद्र की मुखरियाँ - 5

UNIT II : 'Bharatmata Gramavasi' (Kavita) by Sumitranand Pant 6hrs.
सुमित्रानंदन पंत कृत 'भारतमाता ग्रामवासी' (कविता)

UNIT III: 'Beej Vyatha' (Kavita) by Gyanendrapati 6hrs.
ज्ञानेन्द्रपती कृत 'बीज व्यथा' (कविता)

UNIT IV: Introduction to Official Language Hindi, framing questions from passages 6hrs.
राजभाषा हिन्दी का परिचय, अनुछेद से प्रश्न निर्माण

UNIT V : Introduction to Stage Management(Interview) 6hrs.
मंच संचालन (साक्षात्कार) का परिचय

Total: 30hrs

COURSE OUTCOMES:

At the end of this course Students will

CO1, CO2 & CO3 :Familiar with the different poetic expressions of Modern & Contemporary Hindi Poetry

CO4 : Know the importance of official language Hindi

CO5 : Become conversant in Hindi

TEXT BOOKS:

1. Bhartendu Harishchandra, Ed.Ramji Yadav, Bharatendu Sanchayan, Bharatiya Pustak Parishad, 2011.
2. Sumitranandan Pant, Gramya, Lokbharti Prakashan, 2017.
3. Gyanedrapati, Gyanendrapati, Prabhakar Publication, 2022.
4. Bhatia Kailashchandra, Rajbhasha Hindi, Vani Prakashan,2018.

REFERENCE BOOKS:

1. Mahesh Sharma, Bhashan Kala, Prabhat Prakashan, 2019.
2. Raghavan T.E.S. Rajbhasha Hindi Amarkosh.

WEB RESOURCES:

1. -http://kavitakosh.org
2. Bharatendu Harishchandra
3. https://www.amarujala.com/kavya/kavya-charcha/bhartendu-harishchandra-poems-naye-jamane-ki-mukariyan?page=5
4. Sumitranandan Pant- http://kavitakosh.org
5. https://www.hindiadda.com/beej-vyatha-gyanendrapati/
6. Hindi Rajbhasha: https://navodaya.gov.in

24LFRE41 **FRENCH - IV**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES :

The lessons are being chosen:

- To propose to do something and respond to a proposal
- To respond to a request
- To accuse, to blame
- To complain, to protest
- To express cause and consequence
- To express opinion about facts

Units:

UNIT I :

Entreprendre

Les pronoms démonstratifs, les pronoms interrogatifs. 6 hours

UNIT II :

Vous avez gagne

Les pronoms en et y, les formation des adverbes en-ment 5 hours

UNIT III :

Ne quittez pas

La mise en relief (c'est ..... qui, c'est …….que). 4 hours

UNIT IV :

Argent trop cher

l'opposition- toujours/ne…jamais. 4 hours

UNIT V :

Le pétrole fou

la cause et la consequence. 5 hours

Parlez-moi d'amour

le conditionnel present, le gérondif. 6 hours

Total no. of hours: 30 hours

COURSE OUTCOMES :

CO1 : The students would be able to propose to do something and respond to a proposal

CO2 : The students would be able to respond to a request

CO3 : The students would be able to accuse, to blame

CO4 : The students would be able to complain, to protest

CO5 : The students would be able to express cause and consequence 12) The students would be able to express opinion about facts

REFERENCE BOOKS:

1. Prescribed book: LATITUDES 1 (A2/B1) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau
2. REFERENCE BOOKS book: SAISON A2 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu,

24LENG41 **ENGLISH IV**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To develop effective oral communication skills for professional contexts such as presentations and meetings.
- To enhance written communication abilities, including business correspondence and reports.
- To improve professional vocabulary and language usage appropriate for various fields and industries.
- To practice critical thinking and problem-solving skills through case studies and discussions.
- To prepare students for job interviews, networking, and career advancement through professional English proficiency.

Credit Hours

Unit I - Technical Writing 6

- Spelling, Punctuation, Spot the error
- Hints development,
- Cliches, Redundancies
- Modifiers.

Unit II - Creative Writing 6

- Instructions and recommendations
- Interpretation of graphs, charts and pictures

Unit III - Professional Writing 6

- Agenda
- Minutes of the meeting
- Review Circular

Unit IV - Organization of Writing 6

- Paragraph Writing
- Essay writing
- Proposal Writing

Unit V - Speech Writing 6

- Welcome address
- Vote of thanks
- Oral presentation
- E-mail and SMS text

Total Hours :30

COURSE OUTCOMES:

At the end of this course, students would have learnt to,

CO1 demonstrate proficiency in language use.

CO2 master the nuances of Spoken and Written Communication skills in professional contexts.

CO3 develop confidence and clarity in Professional English usage.

REFERENCE BOOKS:

1. Professional English by Meenakshi Raman and Sangeetha Sharma -2018.
2. General English for all competitive examinations by S.C. Gupta -2016.

24CBCY41 **ETHICAL HACKING**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

This course covers the theory and practices of finding the vulnerabilities through forming the different attacks and then defining the appropriate security policy including the action to detect or prevent the attacks and thus reduce the damages. Students will learn to use a wide range of tools for network scanning, reconnaissance, system hacking, Trojan/backdoor analysis, sniffing, and wireless hacking.

UNIT I INTRODUCTION TO ETHICAL HACKING 9

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 9

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 9

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 9

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 9

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.

Total: 45 Hours

COURSE OUTCOMES:

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

CO-1: To Describe and understand the basics of the ethical hacking

CO-2: Able to perform the foot printing and scanning

CO-3: Characterize the malware and their attacks and detect and prevent them.

CO-4: To understand the basic concepts of sniffers and session hijacking.

CO-5: Able to learn Intrusion Detection Systems and physical security.

TEXT BOOKS:

1. Michael Gregg (2019),"Certified Ethical Hacker", Version 10, Third Edition, Pearson IT Certification
2. Roger Grimes (2017), ,"Hacking the Hacker" , 1st Edition, Wiley Publication.
3. Ankit Fadia (2006) , "The Unofficial Guide to Ethical Hacking", Laxmi Publications, 2nd Edition.

REFERENCE BOOKS:

1. Berrera, R. (2023), Practical Ethical Hacking: A Hands-on Introduction to Ethical Hacking, Penetration Testing, and Cybersecurity. Packt Publishing.
2. Ryan, P. (2021), The Hacker Playbook 3: Practical Guide to Penetration Testing. CreateSpace Independent Publishing Platform.

24CBCY42 DATA COMMUNICATION AND NETWORKING

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To familiarize the students with networking concepts, to understand OSI REFERENCE BOOKS model for networking protocols, TCP/IP implementation, LANs/WANs, internetworking technologies, Routing and Addressing.

UNIT I INTRODUCTION TO COMPUTER NETWORKS 9

Overview of Computer Networks: Definition and Objectives, Applications and Examples - Network Components and Architecture, **Network Models:** OSI Model: Layers and Functions, TCP/IP Model: Layers and Functions -Comparison between OSI and TCP/IP Models - **Network Topologies:** Physical vs. Logical Topologies, Common Topologies: Star, Ring, Bus, Mesh, Hybrid,

UNIT II PHYSICAL LAYER & DATA LINK LAYER 9

Data Transmission: Analog vs. Digital Signals, Transmission Modes: Simplex, Half-Duplex, Full-Duplex, Bandwidth and Latency, **Networking Devices:** Routers, Switches, Hubs, Bridges, Gateways, Functions and Configurations of Each Device. **Data Link Layer Fundamentals:** Functions of the Data Link Layer, Framing, Error Detection, and Error Correction, Flow Control Mechanisms, **Ethernet:** Ethernet Standards and Frame Structure, MAC Addressing and ARP, Ethernet -Switching: Basic Concepts and Methods

UNIT III: NETWORK LAYER & ADDRESSING 9

Network Layer: IP Routing: Static vs. Dynamic Routing, Routing Protocols: RIP, OSPF, BGP,Network Address Translation (NAT) **Network Protocols:** Introduction to TCP/IP Protocol Suite, IP Addressing: IPv4 and IPv6 Subnetting and CIDR Notation **Address Resolution Protocol (ARP):** ARP Operation and Table, ARP Spoofing and Security Considerations **Virtual LANs (VLANs):** Concept of VLANs, VLAN Tagging and Configuration, Benefits and Use Cases

UNIT IV : TRANSPORT LAYER & NETWORK SECURITY 9

Transport Layer: TCP vs. UDP: Characteristics and Use Cases, TCP Handshake and Connection Management, Flow Control and Congestion Control in TCP **Congestion Control Algorithms:** Techniques: Slow Start, Congestion Avoidance, Fast Retransmit, Fast Recovery,

TCP Variants: TCP Reno, TCP Vegas. **Quality of Service (QoS):** QoS Principles and Mechanisms, Differentiated Services (DiffServ) and Integrated Services (IntServ) **Network Security Fundamentals:** Threats and Vulnerabilities, Basic Security Mechanisms: Firewalls, VPNs, Encryption

UNIT IV: APPLICATION LAYER AND EMERGING TECHNOLOGIES 9

Application Layer Protocols: HTTP/HTTPS: Structure and Operation, FTP, SMTP, POP3, IMAP: Protocols and Uses, DNS: Domain Name System and Resolution **Network Applications:** Web Browsing, Email Communication, File Transfer, Voice over IP (VoIP) and Streaming. **Emerging Technologies:** Software-Defined Networking (SDN), Network Function Virtualization (NFV), Internet of Things (IoT) and its Impact on Networking, **Network Management:** SNMP: Simple Network Management Protocol, Network Monitoring, Tools and Techniques, **Future Trends in Networking:** 5G and Beyond, Network Automation and Artificial Intelligence in Networking.

Total: 45 Hours

COURSE OUTCOMES:

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

CO-1: Understand the concept of Computer networks and Data Transmission.

CO-2: Understand different types of protocols used for transmission of data.

CO-3: Apply Algorithm for congestion control.

CO-4: Apply error detection and control methods.

CO-5: Model the LAN and WAN configuration using different media.

TEXT BOOKS:

1. Andrew S. Tanenbaum (2011), "Computer Networks", 5th Edition, Pearson Education.
2. James F. Kurose and Keith W. Ross (2021), "Computer Networking: A Top-Down
3. Approach", 8th Edition, Pearson.

REFERENCE BOOKS:

1. William Stallings (2021), “Data and Computer Communications”,10th Edition Publisher: Pearson.
2. Jerry Fitzgerald and Alan Dennis (2020), “Business Data Communications and Networking”, Edition Publisher: Wiley.

3. Behrouz A. Forouzan (2012), "Data Communications and Networking", 5th Edition, McGraw-Hill Education.
4. Larry L. Peterson and Bruce S. Davie (2019), "Computer Networks: A Systems Approach", 6th Edition, Morgan Kaufmann.
5. Bhavneet Sidhu (2023), An Integrated Approach to Computer Networks, Khanna
6. Publishing House.

WEB RESOURCES:

1. Cisco Networking Academy - Online Courses and Resources
2. Network Lessons.com - Tutorials on Various Networking Topics.

24PBCY41 **ETHICAL HACKING LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

This course provides hands-on experience in ethical hacking and cybersecurity tools to understand and mitigate real-world security threats. The course focuses on practical applications, from enumeration and foot printing to advanced attacks like TCP/IP hijacking and wireless denial-of-service (DoS). By the end of the course, students will be proficient in using ethical hacking tools to identify vulnerabilities, conduct security assessments, and address cybersecurity issues through research and practical implementation.

LIST OF PROGRAMS:

1. List the tools for Ethical hacking.
2. Implement Foot printing and Reconnaissance using tools 3d Traceroute, Alchemy Eye, DNS Tools and Network Solution Whois.
3. Implement Network Scanning using tools Advanced Port Scanner, Colasoft Ping Tool, Hide Your IP Address, Nessus and Nmap.
4. Implement Enumeration using tools Default Password List, Default Password List, OpUtil Network Monitoring Tool and OpUtil Network Monitoring Tool.
5. Implement system hacking using tools Actual spy, Alchemy Remote Executor, Armor Tool and Fsecure BlackLight.
6. Implement Trojan and Backdoors using tools Absolute Startup Manager, Absolute Startup Manager, Netwirx Services Monitor and StartEd Lite.
7. Implement Viruses and Worms using tools Anubis Analyzing Unknown Binaries, Filterbit, Sunbelt CWSandbox and ThreatExpert.
8. Implement sniffers using tools Colasoft Capsa Network Analyzer, EffeTech HTTP Sniffer, Packet Sniffer and PRTG Network Monitor.
9. Write a research paper in which Ethical Hacking tools are used to address any problem definition in cyber security.
10. Implement wireless hacking using network sniffing to find the SSID and hack a wireless network.
11. Implement TCP/IP hijacking using Shijack tools.
12. Implement Wirelesss Denial of Services(Wireless DoS) Attacks using Pyloris tools.

COURSES OUTCOMES:

CO1: Gain proficiency in using various ethical hacking tools for network scanning, reconnaissance, and system security.

CO2: Implement footprinting, reconnaissance, and network scanning techniques using industry-standard tools.

CO3: Conduct enumeration and system hacking to identify vulnerabilities and test system security.

CO4: Analyze and implement malware, Trojans, and backdoor attacks using specialized tools.

CO5: Perform advanced attacks like TCP/IP hijacking and wireless DoS, and apply ethical hacking tools to solve cybersecurity problems.

TEXT BOOKS:

1. Michael Gregg (2019),"Certified Ethical Hacker", Version 10, Third Edition, Pearson IT Certification
2. Roger Grimes (2017), ,"Hacking the Hacker" , 1st Edition, Wiley Publication.
3. Ankit Fadia (2006) , "The Unofficial Guide to Ethical Hacking", Laxmi Publications, 2nd Edition.

REFERENCE BOOKS:

1. Berrera, R. (2023), Practical Ethical Hacking: A Hands-on Introduction to Ethical Hacking, Penetration Testing, and Cybersecurity. Packt Publishing.
2. Ryan, P. (2021), The Hacker Playbook 3: Practical Guide to Penetration Testing. CreateSpace Independent Publishing Platform.

24PBCY42 NETWORK COMMUNICATION LAB

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

The student learns to work with various Redundancy Check Algorithms, Sliding Window Protocol, Routing Algorithm, Subnetting Procedures.

LIST OF PROGRAMS:

1. Configure Basic Network Settings:
   a) IP Address Configuration
   b) Subnet Mask and Gateway Settings
2. Implement Network Protocols:
   a) Write a simple Python script to perform DNS resolution.
   b) Implement a basic HTTP client-server application.
3. Network Simulation:
   a) Use network simulation tools (e.g., Cisco Packet Tracer) to design and simulate network topologies.
   b) Configure routers and switches in a simulated environment.
4. Performance Measurement:
   a) Measure network performance using tools like `ping`, `traceroute`, and `iperf`.
   b) Analyze network traffic using Wireshark.
5. Configure VLANs on a switch and verify using simulation tools.
6. Set Up a Simple Web Server:
   a) Deploy a basic web server and configure HTTP/HTTPS access.
7. a) Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute.
   b) Capture ping and trace route PDUs using a network protocol analyzer and examine.
8. Write a HTTP web client program to download a web page using TCP sockets.
9. Applications using TCP sockets like: a) Echo client and echo server b) Chat Simulation of DNS using UDP sockets.
10. Implement Remote Procedure call under Client / Server Environment.
11. Write a code simulating ARP /RARP protocols.
12. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.

COURSES OUTCOMES:

CO1: Configure IP addresses**,** subnet masks**,** and gateway settings for basic network setups, gaining foundational skills in network configuration.

CO2: Implement basic HTTP client-server applications, providing practical experience in network programming.

CO3: Design and simulate network topologies using tools like Cisco Packet Tracer**.**

CO4: Configuring routers and switches within simulated environments.

CO5: Measure network performance using tools like `ping`, `traceroute`, and `iperf`. They will also gain skills in analyzing network traffic using Wireshark**.**

TEXT BOOKS:

1. Andrew S. Tanenbaum (2011), "Computer Networks", 5th Edition, Pearson Education.
2. James F. Kurose and Keith W. Ross (2021), "Computer Networking: A Top-Down Approach", 8th Edition, Pearson.

REFERENCE BOOKS:

1. William Stallings (2021), “Data and Computer Communications”**,**10th Edition Publisher: Pearson.
2. Jerry Fitzgerald and Alan Dennis (2020), “Business Data Communications and Networking",Edition Publisher: Wiley.
3. Behrouz A. Forouzan (2012), "Data Communications and Networking", 5th Edition, McGraw-Hill Education.
4. Larry L. Peterson and Bruce S. Davie (2019), "Computer Networks: A Systems Approach", 6th Edition, Morgan Kaufmann.
5. Bhavneet Sidhu (2023), An Integrated Approach to Computer Networks, Khanna Publishing House.

WEB RESOURCES:

1. Cisco Networking Academy - Online Courses and Resources
2. Network Lessons.com - Tutorials on Various Networking Topics.

24SBCY41 INDUSTRY ORIENTED EMPLOYABILITY SKILLS
RUST POGRAMMING LANGUAGES

L	T	P	O	C
1	0	2	1	2

COURSE OBJECTIVE:

Introduce students to the Rust programming language, focusing on security, performance, and memory safety. Teach how Rust prevents vulnerabilities such as buffer overflows, null-pointer dereferencing, race conditions, etc. Develop skills for writing secure systems-level applications relevant to cybersecurity. Provide hands-on training in Rust for secure networking, cryptography basics, and system utilities. Prepare students to use Rust for malware analysis tools, exploit mitigation tools, and secure application development.

UNIT I INTRODUCTION TO RUST & SECURE PROGRAMMING 6

Importance of Rust in modern cybersecurity- Installing Rust (rustup, cargo)-Rust project structure-Variables, constants, types, type inference-Control flow: if, loop, while, for-Pattern matching with match

UNIT II OWNERSHIP, BORROWING & LIFETIMES (CORE SECURITY CONCEPTS) 6

Ownership model-Lifetimes & lifetime annotations-Memory safety without garbage collection-Stack vs heap-Avoiding common vulnerabilities:Buffer overflow- Null-pointer dereferencing-Use-after-free

UNIT III DATA STRUCTURES & FUNCTIONAL FEATURES 6

Strings & slices-Arrays, vectors, maps, sets-Structs, enums-Traits & generics-Error handling-Modules, crates, and package management with Cargo

UNIT IV CONCURRENCY & ASYNCHRONOUS PROGRAMMING 6

Concurrency Challenges In Cybersecurity-Threads & Synchronization-Channels, Message Passing-Mutex, Rwlock, Arc-Async Programming Using Async/Await-Building Concurrent Network Tools

UNIT V SYSTEMS & NETWORK PROGRAMMING 6

File handling-Working with command-line arguments-Process management-TCP/UDP socket programming-HTTP requests and servers (request, hyper)-Parsing and generating JSON-Using Rust for secure network scanners & log analyzers

Total: 30 Hours

REFERENCE BOOKS:

1. **"The Rust Programming Language"** — Steve Klabnik & Carol Nichols (Official Book).
2. **"Programming Rust"** — Jim Blandy, Jason Orendorff & Leonora F. S. Tindall, O'Reilly.
3. **"Rust for Rustaceans"** — Jon Gjengset.

COURSE OUTCOMES:

CO1: Understand Rust fundamentals including ownership, borrowing, and lifetimes.
CO2: Use Rust's type system and memory safety features to write secure programs.
CO3: Implement Rust programs using functions, enums, structs, collections, and traits.
CO4: Apply concurrency and asynchronous programming for secure and scalable systems.
CO5: Develop Rust applications for networking, file handling, and cybersecurity tasks.

SEMESTER V

24CBCY51 **APPLIED CRYPTOGRAPHY**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

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

UNIT I INTRODUCTION TO CRYPTOGRAPHY 9

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 9

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 9

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 – EIgamal – Schnorr signature.

UNIT IV SECURITY PRACTICE AND SYSTEM SECURITY 9

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 9

E-mail Security: Security Services for E-mail-attacks possible through E-mail – Establishing keys privacy- Authentication 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.

Total: 45 Hours

COURSE OUTCOMES:

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

CO1: Apply cryptographic algorithms for encrypting and decryption for secure data transmission.

CO2: Get the knowledge about the security services available for internet and web applications.

CO3: Gain the knowledge of security models and published standards.

CO4: Identify and investigate network security threat.

CO5: Analyze and design network security protocols.

TEXT BOOKS:

1. Behrouz A.Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security,
5. Cryptography and Network Security, 3rd Edition" (2021), Tata McGraw Hill.
6. Cryptography and Network Security: Principles and Practices, 8th Edition" (2020), Pearson Education.
7. Understanding Cryptography: A Textbook for Students and Practitioners, 2nd Edition" (2019), Springer
8. William Stallings, "Cryptography and Network Security: Principles and Practices", 6th Edition, Pearson Education Ltd, 2016.

REFERENCE BOOKS:

1. Bart Preneel, Christof Paar, Jan Pelzl (2010.), "Understanding Cryptography", Springer-Verlag Berlin Heidelberg.
2. Atul Kahate (2011), "Cryptography and Network Security", Mc Graw Hill, 3rd Edition. Behrouz A.Forouzan, Debdeep Mukhopadhyay (2010), "Cryptography and Network Security", Tata McGraw Hill Second Edition,
3. Wenbo Mao (2003), "Modern Cryptography: Theory and Practice", Prentice Hall PTR, 1st Edition.
4. Douglas R. Stinson (2005), "Cryptography: Theory and Practice", CRC press, 3rd Edition.

24CBCY52 **ANDROID APPLICATION DEVELOPMENT**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES

It provides way to Understand Android Platform Architecture and its tools and Components. Facilitates Designing User Interfaces (UI) and User Experience (UX) by explaining the component interaction. Promotes knowledge about ethical and legal considerations in Android Development along with testing and debugging android applications

UNIT 1: INTRODUCTION TO ANDROID DEVELOPMENT 9

Overview of Mobile Development - Introduction to Android OS and its architecture- Evolution of Android versions and key features- Setting Up the Development Environment- Installing and configuring Android Studio - Setting up Android SDK and AVD Manager - Fundamentals of Android App Components - Activities, Fragments, Services, Broadcast Receivers, Content Providers - Android Manifest file and its role in app configuration

UNIT 2: USER INTERFACE DESIGN AND LAYOUTS 9

User Interface Components- Views, ViewGroups, and their properties - Layout types: Linear, Relative, Constraint layouts- Handling user interactions and events- Material Design Principles - Guidelines for creating visually appealing and intuitive interfaces - Using RecyclerView and CardView for displaying data

UNIT 3: DATA HANDLING AND STORAGE 9

Managing Data with SQLite - Creating databases, tables, and performing CRUD operations - Working with SQLiteOpenHelper and Content Providers - Networking and Web Services - Making HTTP requests using Retrofit or Volley libraries - Parsing JSON data and handling responses

UNIT 4: ADVANCED TOPICS IN ANDROID DEVELOPMENT 9

Background Processing and Services - Implementing background tasks with AsyncTask, Threads, and Handlers - Using Intent Service and Job Scheduler for long-running operations - Working with Multimedia - Integrating multimedia features: audio, video, and camera - Using MediaPlayer and Camera APIs

UNIT 5: ADVANCED TECHNIQUES AND DEPLOYMENT 9

Location-Based Services and Maps - Utilizing GPS and Google Maps API for location-aware applications - Displaying user location and integrating location services - Testing, Debugging, and Optimization - Unit testing with JUnit and UI testing with Espresso - Debugging techniques and performance optimization strategies - App Deployment and Distribution - Preparing apps for release: signing APKs, configuring release builds - Publishing apps on Google Play Store and managing updates.

Total: 45 Hours

COURSES OUTCOMES:

CO-1: Understand the fundamental concepts of Android development, including Android OS architecture, app components, and configuration through Android Studio and SDK.

CO-2: Develop user-friendly and visually appealing Android applications by mastering user interface design, layout management, and Material Design principles.

CO-3: Implement SQLite databases, performing CRUD operations, and interacting with web services using libraries like Retrofit or Volley.

CO-4: Implement advanced Android development techniques such as background processing, multimedia integration and using services for long-running tasks.

CO-5: Utilize location-based services, optimize app performance, and prepare Android applications for deployment, debugging, and publishing apps on the Google Play Store.

TEXT BOOKS:

1. Bill Phillips and Chris Stewart ,"Android Programming: The Big Nerd Ranch Guide".
2. Michael Burton, "Android App Development for Dummies".
3. Ian F. Darwin ,"Android Cookbook: Problems and Solutions for Android Developers".
4. Bill Phillips and Chris Stewart, ”Android Programming: The Big Nerd Ranch Guide".
5. Android Programming: The Big Nerd Ranch Guide, 5th Edition" (2020).

REFERENCE BOOKS:

1. Michael Burton (2020), Android App Development for Dummies" , 4th Edition"
2. Ian F. Darwin.,” Android Cookbook: Problems and Solutions for Android Developers" .
3. Android Cookbook: Problems and Solutions for Android Developers, 3rd Edition".(2019).

24CBCY53 MACHINE LEARNING FOR CYBER SECURITY

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

It helps to learn the major phases of the threat life cycle, detailing how you can implement smart solutions for your existing cybersecurity products and effectively build intelligent and future-proof solutions.

UNIT -1 BASICS OF MACHINE LEARNING IN CYBER SECURITY 12

Definitions of machine learning and use cases-Delving into machine learning in the cyber security world -Different types of machine learning systems- Different data preparation techniques -Machine learning architecture - A more detailed look at statistical models and machine learning models - Model tuning to ensure model performance and accuracy

UNIT -1I -MACHINE LEARNING TOOLS 12

Time Series Analysis and Ensemble Modeling - Time series and its different classes - Time series decomposition - Analysis of time series in cyber security - Prediction of DDoS attack - Ensemble learning methods and voting ensemble methods to detect cyber attacks

UNIT III- SEGREGATING LEGITIMATE AND LOUSY URLS 12

Understanding URLs and how they fit in the internet address scheme - Introducing malicious URLs - Looking at the different ways malicious URLs propagate - Using heuristics to detect malicious URLs, using machine learning to detect malicious URLs, **Knocking Down CAPTCHAs -** Characteristics of CAPTCHAs -Using artificial intelligence to crack CAPTCHAs - Types of CAPTCHA -Solving CAPTCHAs with neural networks

UNIT IV - USING DATA SCIENCE TO CATCH EMAIL FRAUD AND SPAM AND EFFICIENT NETWORK 12

Anomaly Detection Using k-means - Fraudulent emails and spoofs -Types of email fraud -Spam detection using the Naive Bayes algorithm - Featurization techniques that convert text-based emails into numeric values - Spam detection with logistic regression -Get hold of information - Modify information - Disrupt services -Perform DDoS to and from the server where information is stored - Exploit using malware and viruses - Privilege escalation and credential compromise

UNIT V - PROTECTING SENSITIVE INFORMATION AND ASSETS 12

Authentication abuse prevention - Account reputation scoring - User authentication with keystroke recognition, Biometric authentication with facial recognition - Fraud Prevention with

Cloud AI Solutions.

How to leverage machine learning (ML) algorithms for fraud detection - How bagging and boosting techniques can improve an algorithm's effectiveness - How to analyze data with IBM Watson and Jupyter, Notebook -How to resort to statistical metrics for results evaluation.

Total: 60 Hours

COURSES OUTCOMES:

CO1: Understand the fundamentals of machine learning (ML) and its application in cybersecurity, including various ML systems, data preparation techniques, and model performance tuning.

CO2: Gain practical knowledge of time series analysis and ensemble modeling techniques to detect and predict cyber threats, such as DDoS attacks, using advanced machine learning methods.

CO3: Develop expertise in detecting and classifying malicious URLs by utilizing machine learning and heuristics, as well as leveraging AI techniques to solve CAPTCHAs and identify fraudulent URLs.

CO4: Apply machine learning algorithms to tackle email fraud, spam detection, and network anomaly detection using methods such as k-means clustering, Naive Bayes, and logistic regression.

CO5: Explore methods to protect sensitive information and assets, including fraud Prevention through ML techniques like keystroke recognition, biometric authentication, and leveraging cloud AI solutions for cybersecurity.

TEXT BOOKS:

1. Clarence Chio and David Freeman (2018). Machine Learning and Security: Protecting Systems with Data and Algorithms *O'REILLY* Publications.
2. McKinney, W Brij B. Gupta and Quan Z. Sheng.(2019). Machine Learning for Computer and Cyber Security: Principle, Algorithms, and Practices (Cyber Ecosystem and Security), CRC Press Publication

REFERENCE BOOKS:

1. Dr. Nilakshi Jain (2019). Artificial Intelligence, As per AICTE: Making a System Intelligent, Wiley Publication
2. Alessandro Parisi .(2019). Hands-On Artificial Intelligence for Cybersecurity: Implement smart AI systems for preventing cyber attacks and detecting threats and network anomalies, Packt Publication .

24PBCY51 **CRYPTOGRAPHY LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES

This course is that to understand the principles of encryption algorithms, conventional and public key cryptography practically with real time applications.

LIST OF PROGRAMS:

1. Write a Java program to perform encryption and decryption using the algorithms:
   a) Ceaser Cipher b) Substitution Cipher c) Hill Cipher
2. Write a Java program to perform encryption and decryption using the algorithms:
   a) Playfair Cipher b) Vigenere Cipher
3. Write a Java program to implement the DES algorithm logic
4. Write a JAVA program to implement the Rijndael algorithm logic.
5. Using Java Cryptography, encrypt the text "Hello world" using BlowFish. Create your own key using Java key tool.
6. Write a Java program to implement RSA Algorithm.
7. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
8. Implement the Signature Scheme - Digital Signature Standard
9. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
10. Setup a honey pot and monitor the honeypot on network (KF Sensor).
11. Perform wireless audit on an access point or a router and decrypt WEP and WPA. (Net Stumbler)
12. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

Total: 15 Hours

COURSE OUTCOMES:

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

CO1: Apply cryptographic algorithms for encrypting and decryption for secure data transmission.

CO2: Get the knowledge about the security services available for internet and web applications.

CO3: Gain the knowledge of security models and published standards.

CO4: Identify and investigate network security threat.

CO5: Analyze and design network security protocols.

TEXT BOOKS:

1. Behrouz A.Forouzan, Debdeep Mukhopadhyay (2021), “Cryptography and Network Security”, 3rd Edition" Tata McGraw Hill.
2. Cryptography and Network Security: Principles and Practices, 8th Edition" (2020), Pearson Education.
3. Understanding Cryptography: A Textbook for Students and Practitioners, 2nd Edition" (2019), Springer
4. William Stallings (2016)., “Cryptography and Network Security: Principles and Practices”, 6th Edition, Pearson Education Ltd.

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1. Bart Preneel, Christof Paar, Jan Pelzl (2010.), “Understanding Cryptography”, Springer-Verlag Berlin Heidelberg.
2. Atul Kahate (2011), “Cryptography and Network Security”, Mc Graw Hill, 3rd Edition.
3. Behrouz A.Forouzan, Debdeep Mukhopadhyay (2010), “Cryptography and Network Security”, Tata McGraw Hill Second Edition,
4. Wenbo Mao (2003), “Modern Cryptography: Theory and Practice”, Prentice Hall PTR, 1st Edition.
5. Douglas R. Stinson (2005), “Cryptography: Theory and Practice”, CRC press, 3rd Edition.

24PBCY52 **ANDROID APPLICATION DEVELOPMENT LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

To gain hands-on experience with essential Android development techniques, and preparing students for real-world application development challenges and deployment processes.

LIST OF PROGRAMS

1. Setting Up Android Development Environment - Install Android Studio, set up SDK, and create a basic "Hello World" app.
2. Building User Interfaces - Designing UI using XML layouts and basic UI components.
3. Working with Activities and Intents - Understand activities lifecycle and pass data between activities using intents.
4. RecyclerView and CardView - Implement a RecyclerView to display a list of items with CardView.
5. Data Storage with SQLite - Implement SQLite database operations for data persistence.
6. Networking and RESTful APIs - Make HTTP requests and handle JSON responses using Retrofit or Volley.
7. Background Processing with AsyncTask - Perform background tasks using AsyncTask to avoid UI thread blocking.
8. Working with Fragments - Understand the use of Fragments for building flexible UI layouts.
9. Location-Based Services - Integrate GPS and Google Maps API for location-aware applications.
10. Multimedia and Camera Integration - Capture photos using the camera and integrate multimedia features.
11. Testing and Debugging - Test application functionality and debug common issues.
12. App Deployment and Publishing - Prepare the app for release and publish it on Google Play Store.

Total: 15 Hours

COURSES OUTCOMES:

CO-1: Understand the fundamental concepts of Android development, including Android OS architecture, app components, and configuration through Android Studio and SDK.

CO-2: Develop user-friendly and visually appealing Android applications by mastering user interface design, layout management, and Material Design principles.

CO-3: Implement SQLite databases, performing CRUD operations, and interacting with web services using libraries like Retrofit or Volley.

CO-4: Implement advanced Android development techniques such as background processing, multimedia integration and using services for long-running tasks.

CO-5: Utilize location-based services, optimize app performance, and prepare Android applications for deployment, debugging, and publishing apps on the Google Play Store.

TEXT BOOKS:

1. Bill Phillips and Chris Stewart ,"Android Programming: The Big Nerd Ranch Guide".
2. Michael Burton, "Android App Development for Dummies".
3. Ian F. Darwin ,"Android Cookbook: Problems and Solutions for Android Developers".
4. Bill Phillips and Chris Stewart, ”Android Programming: The Big Nerd Ranch Guide".
5. Android Programming: The Big Nerd Ranch Guide, 5th Edition" (2020).

REFERENCE BOOKS:

1. Michael Burton (2020), Android App Development for Dummies" , 4th Edition"
2. Ian F. Darwin.,” Android Cookbook: Problems and Solutions for Android Developers" .
3. Android Cookbook: Problems and Solutions for Android Developers, 3rd Edition".(2019).

SEMESTER VI

24CBCY61 CYBER CRIME INVESTIGATION AND DIGITAL FORENSICS

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To understand the basic concepts of cybercrime and forensics, to create the awareness through simple practical tips and tricks. The students to learn how to avoid becoming victims of cybercrimes. They have familiar with forensics tools and learn to analyze and validate forensics data.

UNITI 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.

Total: 45 Hours

COURSE OUTCOMES

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

CO1: Understand the types of cybercrime and fundamentals.

CO2: Describe the types of cybercrime offenses and attacks.

CO3: Explain computer forensics and use forensics tools.

CO4: Assess the methods and tools used in digital forensics.

CO5: Design a method to solve a problem in different perspective.

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, 2nd Edition" (2020), Wiley India Publications.
2. Windows Forensics (2016), "The Field Guide for Conducting Corporate Computer Investigations, 2nd Edition", Wiley India Publications.
3. Nina Godbole, Sunit Belapur (2011), "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Publications.
4. James Graham, Richar Howard, Ryan Olson (2011)., "Cyber Security Essentials", CRC Press, Tailor and Francis Group.

REFERENCE BOOKS:

1. Robert Jones (2005). , "Internet Forensics: Using Digital Evidence to Solve Computer Crime", O'Reilly Media.
2. Chad Steel (2006), "Windows Forensics: The field guide for conducting corporate computer investigations", Wiley India Publications.
3. Nelson Phillips and Enfinger Steuart (2019), "Computer Forensics and Investigations Computer Forensics and Investigations, 5th Edition" Cengage Learning.

WEB RESOURCES:

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

24CBCY62 **INTRODUCTION TO GENERATIVE AI**

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES

To learn the fundamentals of Neural Networks and their various types. Understand and apply the fundamentals of Generative AI and large language models. Implement GPT architecture for text generation and dialogue systems. Fine-tune BERT for downstream NLP tasks and explore advanced Transformer architecture.

UNIT I FOUNDATIONS OF AI AND NEURAL NETWORKS 12

History and evolution of AI/ML, Deep learning revolution, Transfer learning, History of Neural Natural Language Processing, Structure of Artificial Neural Networks, Steps in Training an Artificial Neural Network, Parameters and Hyperparameters, Backpropagation.

UNIT II INTRODUCTION TO LARGE LANGUAGE MODELS 12

Overview of Generative AI and Large Language Models. Basics of attention mechanisms and Transformer architecture. Pre-training techniques and transfer learning strategies.

UNIT III GPT MODELS AND APPLICATIONS 12

Study of GPT architecture and variants. Applications of GPT models in text generation and dialogue systems. Case study based implementation of GPT-based tasks. GPT-based chatbot enhances E-Shop's customer support service

UNIT IV BERT AND ADVANCED TECHNIQUES 12

Understanding BERT architecture and pre-training objectives. Fine-tuning BERT for downstream NLP tasks. Exploration of advanced Transformer architectures and techniques

UNIT V PYTHON AND TENSORFLOW 2 IN GENERATIVE AI: 12

Overview of Python and TensorFlow 2, Preprocessing and cleaning data for Generative AI applications. Visualizing data distributions and patterns in Generative AI datasets. Introduction to TensorFlow's computation graph and eager execution

Total: 60 Hours

COURSE OUTCOMES:

CO1: Understand generative AI principles and word embeddings for text representation.

CO2: Apply Large Language Models effectively, including pre training and transfer learning.

CO3: Apply the GPT model for natural language processing tasks.

CO4: Apply the BERT model for natural language processing tasks.

Identify different types of generative AI models suitable for music generationn

CO5: To learn Python and TensorFlow skills for Generative AI.

TEXT BOOKS:

1. Altaf Rehmani, “Generative AI for everyone: Understanding the essentials and applications of this breakthrough technology".
2. Numa Dhamani (2024), "Introduction to Generative AI” ,Kindle Edition.

REFERENCE BOOKS:

1. Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook".

24CBCY63 **BLOCKCHAIN AND CRYPTOCURRENCY**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To understand how block chain systems work, where they are used, their limitations, and how they affect organizations and society now and in the future.

UNIT I INTRODUCTION 12

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 12

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 12

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

UNIT IV CRYPTOCURRENCY 12

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 12

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.

Total: 60 Hours

COURSE OUTCOMES:

At the end of this 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.

CO2: To learn about different kinds of forking and explain the Bitcoin's network mechanisms for maintaining and upgrading

CO3: Explain about Nakamoto consensus. To describe differences between proof-of-work and **proof**- of-stake consensus.

CO4: Establishing deep understanding of the Ethereum model, its consensus model, code execution, operation of its network, storage options and main actors that participate on its protocol.

CO5: Expertise various development environments and different approaches and evaluate security, privacy, and efficiency of a given block chain system.

TEXT BOOKS:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder (2016)., "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press.
2. Antonopoulos (2014). "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reiley, 1st Edition.

REFERENCE BOOKS:

1. Satoshi Nakamoto (2008), "Bitcoin: A Peer-to-Peer Electronic Cash System".
2. Dr. Gavin Wood (2014) , "ETHEREUM: A Secure Decentralized Transaction Ledger", Yellow paper.
3. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli (2016.), "A survey of attacks on Ethereum smart contracts".

24CBCY64 **PENETRATION TESTING**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To provide a fundamental knowledge of Network Penetration testing and determines how well the security defenses are protecting our IT assets. Network penetration testing helps address the concerns about the actual impact an attack could have on the organization.

UNIT I INTRODUCTION 12

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 DEFENSE 12

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 12

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 12

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 12

Working with the sample Network penetration testing commands – Vulnerability Assessment, Exploitation, Privilege Escalation, Web Applications, Password Attacks, Networking & Shells, Metasploit.

Total: 60 Hours

COURSES OUTCOMES:

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

CO1: To Defend against the most common attacks to networks.

CO2: To determine what type of firewall solution, Intrusion detection and Prevention system is appropriate.

CO3: To Use point-to-point tunnelling protocol (PPTP), layer 2 tunnelling Protocol (L2TP) as an encryption tool.

CO4: To add security with privacy to a communication using IPSec for VPNs.

CO5: To Expertise in wireless security solutions

TEXT BOOKS:

1. Chuck Easttom, "Network Defense and Countermeasures: Principles and Practices", Pearson education, Second edition, 2014.
2. Randy Weaver, Dawn Weaver, Dean Farwood, "Guide to Network Defense and Countermeasures", Cengage Learning, Third edition, 2014.

WEBSOURCES:

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

24PBCY61 CYBER CRIME INVESTIGATION AND DIGITAL FORENSICS LAB

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES

This Course provides basic insight of Computer Forensics Analysis and to perform E-Mail Investigations. To get deep Knowledge in various Computer Forensic Tools used in Investigation of different Operating System Environments.

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.

Total: 15 Hours

COURSE OUTCOMES

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

CO1: Understand the types of cybercrime and fundamentals.

CO2: Describe the types of cybercrime offenses and attacks.

CO3: Explain computer forensics and use forensics tools.

CO4: Assess the methods and tools used in digital forensics.

CO5: Design a method to solve a problem in different perspective.

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, 2nd Edition" (2020), Wiley India Publications.
2. Windows Forensics (2016), "The Field Guide for Conducting Corporate Computer Investigations, 2nd Edition", Wiley India Publications.
3. Nina Godbole, Sunit Belapur (2011), "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Publications.
4. James Graham, Richar Howard, Ryan Olson (2011)., "Cyber Security Essentials", CRC Press, Tailor and Francis Group,

REFERENCE BOOKS:

1. Robert Jones, "Internet Forensics: Using Digital Evidence to Solve Computer Crime", O'Reilly Media, October, 2005.
2. Chad Steel, "Windows Forensics: The field guide for conducting corporate computer investigations", Wiley India Publications, December, 2006.
3. Nelson Phillips and Enfinger Steuart (2019)**,** "Computer Forensics and Investigations Computer Forensics and Investigations, 5th Edition" Cengage Learning.

WEB RESOURCES:

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

SEMESTER 7

24CBCY71 **DEVOPS SECURITY**

L	T	P	O	C
3	0	0	2	3

COURSES OUTCOMES:

This course provides a comprehensive overview of integrating security into DevOps practices, ensuring secure development, deployment, and operations. Students will learn secure coding principles, infrastructure security, and best practices for securing CI/CD pipelines. The course also covers monitoring, incident response, and compliance with industry regulations. By the end, students will be able to implement security controls throughout the DevOps lifecycle to protect applications and infrastructure from evolving threats.

UNIT 1: INTRODUCTION TO DEVOPS AND SECURITY FUNDAMENTALS 9

Overview of DevOps and Security - Definition, principles, and benefits of DevOps - Integration of security into DevOps practices - Fundamentals of Security - Basic principles of cybersecurity - Common threats and vulnerabilities in software development and deployment processes.

UNIT 2: SECURE DEVELOPMENT PRACTICES 9

Secure Coding Principles - Writing secure code: input validation, error handling, and secure API usage - Using secure coding guidelines and best practices (e.g., OWASP Top Ten) - Code Reviews and Static Analysis- Implementing code review practices for security - Performing static code analysis using tools like SonarQube or Checkmarx.

UNIT 3: INFRASTRUCTURE SECURITY IN DEVOPS 9

Configuration Management Security - Securing configuration management tools (e.g., Ansible, Chef, Puppet)- Managing secrets and sensitive data in configuration files - Container Security - Securing Docker containers: image scanning, container runtime security - Implementing Kubernetes security best practices.

UNIT 4: CONTINUOUS INTEGRATION AND CONTINUOUS DEPLOYMENT (CI/CD) SECURITY 9

Pipeline Security - Securing CI/CD pipelines: automation tools (e.g., Jenkins, GitLab CI/CD) - Implementing pipeline security controls (e.g., automated testing, approval gates) - Artifact Management and Security - Securely managing artifacts in CI/CD pipelines (e.g., Nexus,

Artifactory) - Implementing secure software supply chain practices.

UNIT 5: MONITORING, INCIDENT RESPONSE, AND COMPLIANCE **9**

Continuous Monitoring and Logging - Implementing monitoring solutions for infrastructure and applications - Using logs for security incident detection and response - Incident Response and Forensics - Developing and testing incident response plans - Conducting post-incident reviews and forensic analysis - Compliance and Regulatory Requirements - Understanding compliance frameworks (e.g., GDPR, HIPAA) relevant to DevOps- Implementing security controls to meet regulatory requirements.

Total: 45 Hours

COURSES OUTCOMES:

CO1: Understand the key principles of DevOps and security, and apply security best practices throughout the software development and deployment lifecycle.

CO2: Implement secure coding practices, including input validation, error handling, and secure API usage, while conducting code reviews and static analysis for security vulnerabilities.

CO3: Secure infrastructure in DevOps environments by implementing configuration management security, container security, and Kubernetes security best practices.

CO4: Apply security controls in CI/CD pipelines, including automation tools, pipeline security, and secure artifact management, to safeguard the software delivery process.

CO5: Implement continuous monitoring, develop incident response plans, conduct forensic analysis, and ensure compliance with regulatory frameworks like GDPR and HIPAA in a DevOps context.

TEXT BOOKS:

1. Gene Kim, Patrick Debois, John Willis, and Jez Humble, "The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations".
2. Brendan Burns, "Kubernetes Best Practices: Blueprints for Building Successful Applications on Kubernetes".
3. Richard Bejtlich, "The Practice of Network Security Monitoring: Understanding Incident Detection and Response".

4. Andrew Jaquith., “Security Metrics: Replacing Fear, Uncertainty, and Doubt".
5. Gene Kim, Patrick Debois, John Willis, Jez Humble **Latest Edition**: **2016** (1st Edition), “The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations"

REFERENCE BOOKS:

1. Kubernetes Best Practices: Blueprints for Building Successful Applications on Kubernetes Author**:** Brendan Burns Latest Edition**:** 2019 (1st Edition) Publisher**:** O'Reilly Media.
2. The Practice of Network Security Monitoring: Understanding Incident Detection and Response Author: Richard Bejtlich Latest Edition: 2013 (1st Edition) Publisher: No Starch Press

24CBCY72 INCIDENT RESPONSE AND THREAT INTELLIGENCE

L	T	P	O	C
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COURSES OBJECTIVE:

This course aims to provide a comprehensive understanding of incident response (IR) and threat intelligence (TI) within the context of cybersecurity. Students will learn the fundamental principles and lifecycle of incident response, including preparation, identification, containment, eradication, recovery, and lessons learned. By integrating incident response with threat intelligence, students will develop the skills to detect, analyze, and respond to cybersecurity incidents effectively, while fostering continuous improvement through post-incident reviews and coordination across teams and stakeholders.

UNIT 1 FOUNDATIONS OF INCIDENT RESPONSE AND THREAT INTELLIGENCE 12

Introduction to Incident Response - Definition, goals, and key principles of incident response - Incident response lifecycle: preparation, identification, containment, eradication, recovery, and lessons learned. Understanding Threat Intelligence- Types of threat intelligence: strategic, tactical, and operational. Sources of threat intelligence: open-source, commercial feeds, and threat actor profiles.

UNIT 2: INCIDENT DETECTION AND ANALYSIS 12

Detection Techniques - Network-based detection: IDS/IPS, network traffic analysis - Host-based detection: antivirus, endpoint detection and response (EDR) - Incident Analysis - Initial triage and prioritization of incidents - Root cause analysis and impact assessment.

UNIT 3: INCIDENT RESPONSE PLANNING AND PREPAREDNESS 12

Developing Incident Response Plans (IRPs)- Components of an IRP: roles, responsibilities, and communication procedures- Integration with business continuity and disaster recovery plans- Preparation and Testing - Conducting tabletop exercises and simulations - Training incident response teams and stakeholders.

UNIT 4: THREAT INTELLIGENCE ANALYSIS AND INTEGRATION **12**

Collecting and Analyzing Threat Intelligence - Methods for gathering intelligence: open-source, dark web monitoring, threat feeds - Analyzing and correlating threat data to identify patterns and tactics, techniques, and procedures (TTPs) - Integrating Threat Intelligence - Using threat intelligence to enhance incident detection and response capabilities - Developing threat indicators and signatures for proactive defense.

UNIT 5: INCIDENT RESPONSE COORDINATION AND CONTINUOUS IMPROVEMENT **12**

Coordination and Collaboration - Managing incident response across teams, departments, and external stakeholders. Effective communication strategies during incidents - Post-Incident Activities - Conducting post-incident reviews (PIRs) and root cause analysis - Implementing lessons learned and continuous improvement of incident response processes.

Total: 60 Hours

COURSES OUTCOMES:

CO1: Understand the core principles of incident response (IR) and threat intelligence (TI), including their roles in cybersecurity, and apply these principles in real-world scenarios.

CO2: Identify and utilize various incident detection techniques, both network-based (IDS/IPS) and host-based (antivirus, EDR), to effectively triage and analyze incidents.

CO3: Develop and implement comprehensive Incident Response Plans (IRPs), integrating them with business continuity and disaster recovery strategies to ensure preparedness.

CO4: Collect, analyze, and correlate threat intelligence from diverse sources (open-source, dark web, commercial feeds) to identify tactics, techniques, and procedures (TTPs) of threat actors.

CO5: Coordinate and collaborate across teams and external stakeholders during an incident.

TEXT BOOKS:

1. Jack Chapman (2020) , “Cyber Intelligence: From Baby Steps to Baby Steps”, 1st Edition,.
2. Eric Cole (2019), Cybersecurity Incident Response: How to Contain, Eradicate, and Recover from Incidents, 1st Edition..

REFERENCE BOOKS:

1. E. Eugene Schultz and Russell Shumway, “Incident Response: A Strategic Guide to Handling System and Network Security Breaches”..
2. Incident Response: A Strategic Guide to Handling System and Network Security Breaches: E. Eugene Schultz and Russell Shumway (2017, 2nd Edition).

24CBCY73 INTRUSION DETECTION AND PREVENTION SYSTEM

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES

To prepare students to know regarding the common threats faced today and the necessity of intrusion detection systems for securing the systems. To understand the essential concepts of intrusion detection and prevention. Acquiring knowledge on the state of art of the research in intrusion detection and prevention systems. Enable students to do independent research and be able to model and implement intrusion detection systems.

UNIT I INTRODUCTION 12

Understanding Intrusion Detection –Intrusion detection and prevention basics –IDS and IPS analysis schemes, Attacks, Detection approaches –Misuse detection – anomaly detection – specification-based detection – hybrid detection.

UNIT II THEORETICAL FOUNDATIONS OF DETECTION 12

Taxonomy of anomaly detection system –fuzzy logic –Bayes theory –Artificial Neural networks. Support vector machine –Evolutionary computation –Association rules –Clustering.

UNIT III ARCHITECTURE AND IMPLEMENTATION 12

Centralized – Distributed –Cooperative Intrusion Detection -Tiered architecture.

UNIT IV JUSTIFYING INTRUSIONDETECTION 12

Intrusion detection in security –Threat Briefing –Quantifying risk –Return on Investment (ROI)

UNIT V CASE STUDY 12

Tool Selection and Acquisition Process - Bro Intrusion Detection – Prelude Intrusion Detection - Cisco Security IDS -Snorts Intrusion Detection –NFR security Legal Issues and Organizations Standards: Law Enforcement / Criminal Prosecutions –Standard of Due Care – Evidentiary Issues, Organizations and Standardizations.

Total: 60 Hours

COURSE OUTCOMES:

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

CO-1: Understand the physical location, the operational characteristics and the various functions performed by the intrusion detection and prevention system.

CO-2: Understand the taxonomy of the anomaly detections using fuzzy logic.

CO-3: To understand the concepts of Prior strong experience in operating system and prior hands-on training.

CO-4: Describe how components in different layers inter-operate in the intrusion detection and prevention system.

CO-5: Apply intrusion detection alerts and logs to distinguish attack by using SNORT tool.

TEXT BOOKS:

1. Dr. Guy D. Martin (2020) , “The Art of Intrusion Detection and Prevention" , Focuses on contemporary IPS/IDS systems
2. Ali A. Ghorbani, Wei Lu (2010.), “Network Intrusion Detection and Prevention: Concepts and Techniques”, Springer,
3. Carl Enrolf, Eugene Schultz, Jim Mellander 2004, “Intrusion detection and Prevention”, McGraw Hill,

REFERENCE BOOKS:

1. Paul E. Proctor (2001), “The Practical Intrusion Detection Handbook “, Prentice Hall,.
2. Ankit Fadia and Mnu Zacharia (2007), “Intrusion Alert”, Vikas Publishing house Pvt., Ltd,
3. Earl Carter, Jonathan Hogue (2006)., “Intrusion Prevention Fundamentals”, Pearson Education,
4. Chris Sanders (2014), Network Security Through Data Analysis".

24PBCY71 **DEVOPS SECURITY LAB**

L	T	P	O	C
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COURSE OBJECTIVES:

This course aims to equip students with the practical skills required for modern web development and DevOps practices. It covers the use of version control systems like Git, GitHub, GitLab, and Bitbucket, alongside the implementation of Continuous Integration/Continuous Deployment (CI/CD) principles using tools like Jenkins and Docker. Students will learn containerization, orchestration with Kubernetes, and the Maven build lifecycle.

LIST OF PROGRAMS

1. Exploring Git Commands through Collaborative Coding.
2. Implement GitHub Operations
3. Implement GitLab Operations
4. Implement BitBucket Operations
5. Applying CI/CD Principles to Web Development Using Jenkins,
6. Git, and Local HTTP Server
7. Exploring Containerization and Application Deployment with
8. Docker
9. Applying CI/CD Principles to Web Development Using Jenkins, Git, using Docker Containers
10. Demonstrate Maven Build Life Cycle
11. Demonstrate Container Orchestration using Kubernets
12. Create the GitHub Account to demonstrate CI/CD pipeline using Cloud Platform.

Total: 45 Hours

COURSES OUTCOMES:

CO1: Understand the key principles of DevOps and security, and apply security best practices throughout the software development and deployment lifecycle.

CO2: Implement secure coding practices, including input validation, error handling, and secure API usage, while conducting code reviews and static analysis for security vulnerabilities.

CO3: Secure infrastructure in DevOps environments by implementing configuration management security, container security, and Kubernetes security best practices.

CO4: Apply security controls in CI/CD pipelines, including automation tools, pipeline security, and secure artifact management, to safeguard the software delivery process.

CO5: Implement continuous monitoring, develop incident response plans, conduct forensic analysis, and ensure compliance with regulatory frameworks like GDPR and HIPAA in a DevOps context.

TEXT BOOKS:

1. Gene Kim, Patrick Debois, John Willis, and Jez Humble, "The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations".
2. Brendan Burns, "Kubernetes Best Practices: Blueprints for Building Successful Applications on Kubernetes".

REFERENCE BOOKS:

1. Kubernetes Best Practices: Blueprints for Building Successful Applications on Kubernetes Author**:** Brendan Burns Latest Edition**:** 2019 (1st Edition) Publisher**:** O'Reilly Media.
2. The Practice of Network Security Monitoring: Understanding Incident Detection and Response Author: Richard Bejtlich Latest Edition: 2013 (1st Edition) Publisher: No Starch Press

SEMESTER 8

L	T	P	O	C
3	0	0	2	3

24CBCY81 MALWARE ANALYSIS AND REVERSE ENGINEERING

COURSE OBJECTIVES:

To introduce the fundamentals of malware, types and its effects. To enable to identify and analyze various malware types by static analysis. To enable to identify and analyse various malware types by dynamic analysis. To deal with detection, analysis, understanding, controlling, and eradication of malware

UNIT I INTRODUCTIONAND BASIC ANALYSIS 9

Goals of Malware Analysis, AV Scanning, Hashing, Finding Strings, Packing and Obfuscation, PE file format, Static, Linked Libraries and Functions, Static Analysis tools, Virtual Machines and their usage in malware analysis, Sandboxing, Basic dynamic analysis, Malware execution, Process Monitoring, Viewing processes, Registry snapshots.

UNIT II ADVANCED STATIC ANALYSIS 9

The Stack, Conditionals, Branching, Rep Instructions, Disassembly, Global and local variables, Arithmetic operations, Loops, Function Call Conventions, C Main Method and Offsets. Portable Executable File Format, The PE File Headers and Sections, IDA Pro, Function analysis, Graphing, The Structure of a Virtual Machine, Analyzing Windows programs, Anti-static analysis techniques, obfuscation, packing, metamorphism, polymorphism.

UNIT III ADVANCED DYNAMIC ANALYSIS 9

Live malware analysis, dead malware analysis, analyzing traces of malware, system calls, API calls, registries, network activities. Anti-dynamic analysis techniques, VM detection techniques, Evasion techniques, , Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark, Kernel vs. User-Mode Debugging, OllyDbg, Breakpoints, Tracing, Exception Handling, Patching.

UNIT IV MALWARE FUNCTIONALITY 9

Downloaders and Launchers, Backdoors, Credential Stealers, Persistence Mechanisms,

Handles, Mutexes, Privilege Escalation, Covert malware launching- Launchers, Process Injection, Process Replacement, Hook Injection, Detours, APC injection

UNIT V ANDROID MALWARE ANALYSIS **9**

Android Malware Analysis: Android architecture, App development cycle, APKTool, APKInspector, Dex2Jar, JD-GUI, Static and Dynamic Analysis, Case studies,

Total: 45 Hours

COURSE OUTCOMES:

CO1: Understand the various concepts of malware analysis and their technologies used.

CO2: Possess the skills necessary to carry out independent analysis of modern malware samples using both static and dynamic analysis techniques.

CO3: Understand the methods and techniques used by professional malware analysts.

CO4: To be able to safely analyze, debug, and disassemble any malicious software by malware analysis.

CO5: Understand the concept of Android malware analysis their architecture, and App development.

TEXT BOOKS:

1. Michael Sikorski and Andrew Honig (2012), “Practical Malware Analysis” by No Starch Press, ISBN: 9781593272906
2. Bill Blunden (2009), “The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System”, Second Edition, Jones & Bartlett Publishers,

REFERENCE BOOKS:

1. Jamie Butler and Greg Hoglund (2005), “Rootkits: Subverting the Windows Kernel”, Addison-Wesley Professional.
2. Bruce Dang, Alexandre Gazet, Elias Bachaalany, SébastienJosse (2014.), "Practical Reverse Engineering: x86, x64, ARM, Windows Kernel, Reversing Tools, and Obfuscation",
3. Victor Marak (2015), "Windows Malware Analysis Essentials" Packt Publishing, O’Reilly,

24CBCY82 **DATA SCIENCE USING R**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES :

To equip students with the skills to perform **Data Science tasks using R Programming**, covering data types, data structures, exploratory data analysis, statistical modeling, and visualization.

UNIT-1 INTRODUCTION TO DATA SCIENCE 9

Introduction- Definition - Data Science in various fields - Examples - Impact of Data Science - Data Analytics Life Cycle - Data Science Toolkit - Data Scientist - Data Science Team

Understanding data: Introduction – Types of Data: Numeric – Categorical – Graphical – High Dimensional Data – Classification of digital Data: Structured, Semi-Structured and Un-Structured - Example Applications. Sources of Data: Time Series – Transactional Data – Biological Data – Spatial Data – Social Network Data – Data Evolution.

UNIT-2 INTRODUCTION TO R- FEATURES OF R 9

- Environment - R Studio. Basics of R-Assignment - Modes - Operators - special numbers - Logical values - Basic Functions - R help functions - R Data Structures - Control Structures. Vectors: Definition- Declaration - Generating - Indexing - Naming - Adding & Removing elements - Operations on Vectors - Recycling - Special Operators - Vectorized if- then else- Vector Equality – Functions for vectors - Missing values - NULL values - Filtering & Subsetting.

UNIT-3 MATRICES 9

Creating Matrices - Adding or Removing rows/columns - Reshaping - Operations - Special functions on Matrices. Lists - Creating List – General List Operations - Special Functions - Recursive Lists. Data Frames - Creating Data Frames - Naming - Accessing -

Adding - Removing - Applying Special functions to Data Frames - Merging Data Frames- Factors and Tables.

UNIT- 4 INPUT / OUTPUT 9

– Reading and Writing datasets in various formats - Functions - Creating User-defined functions - Functions on Function Object - Scope of Variables - Accessing Global, Environment - Closures - Recursion. Exploratory Data Analysis - Data Preprocessing - Descriptive Statistics - Central Tendency - Variability - Mean - Median - Range - Variance - Summary - Handling

Missing values and Outliers – Normalization. Data Visualization in R : Types of visualizations - packages for visualizations - Basic Visualizations, Advanced Visualizations and Creating 3D plots.

UNIT- 5 INFERENTIAL STATISTICS WITH R 9

- Types of Learning - Linear Regression- Simple Linear Regression - Implementation in R - functions on lm() - predict() - plotting and fitting regression line. Multiple Linear Regression - Introduction -comparison with simple linear regression - Correlation Matrix - F-Statistic - Target variables Vs Predictors - Identification of significant features - Implementation of Multiple Linear Regression in R.

Total: 45 Hours

COURSES OUTCOMES:

C**O1:** Understand the concepts and applications of **Data Science** and its lifecycle across various fields.

CO2: Gain proficiency in **R Programming** basics, including data structures, operators, and control structures.

CO3: Develop expertise in working with **matrices, lists, data frames**, and handling missing values in R.

CO4: Perform **exploratory data analysis** (EDA) and **data preprocessing**, including descriptive statistics and data visualization in R.

CO5: Apply **inferential statistics** and **linear regression techniques** for data analysis, and implement multiple linear regression in R

TEXT BOOKS:

1. Jeeva Jose, Khanna Publishing House (2024)., "Beginner's Guide for Data Analysis using R Programming".
2. Nina Zumel, John Mount (2014), "Practical Data Science with R", Manning Publications,
3. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman (2014), "Mining of Massive Datasets",Cambridge University Press.
4. Mark Gardener (2012), "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc.,

REFERENCE BOOKS

1. W. N. Venables, D. M. Smith and the R Core Team (2013), "An Introduction to R",
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta (2014), "Practical Data Science Cookbook", Packt Publishing Ltd.
3. Nathan Yau (2011) "Visualize This: The FlowingData Guide to Design, Visualization, and Statistics", Wiley,
4. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich (2015), "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071.

24CBCY83 CYBER LAWS IN INDIA

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

The course intends to inculcate the significance of cyber space and to enlighten the various legal, social and international issues and the various remedies available under the Information Technology Act for the breach and commission of offence in cyber space. The course also outlines international best techniques and the various legal mechanisms to control the various offences in the cyberspace.

UNIT I INTRODUCTION 12

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

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

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

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 1872V. INFORMATION TECHNOLOGYACT,2000 **12**

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.

Case study- protection of cyber consumers in india

Are Cyber Consumers Covered Under the Consumer Protection Act? Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on cyber-Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a Consumer in India.

Total: 60 Hours

COURSE OUTCOMES:

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

CO1: Define and describe the nature and scope of cybercrime.

CO2: Develop knowledge of major incidents of cybercrime and their resulting impact.

CO3: Critically consider specific laws and policies governing cybercrime detection and prosecution.

CO4: To enhance the understanding of problems arising out of online transactions and provoke them to find solutions.

CO5: To clarify the Intellectual Property issues in the cyber space and the growth and development of the law in this regard.

TEXT BOOKS:

1. Yee fen Lim, (2017), "Cyber space law commentaries and Materials", second edition, Galexia Consulting Pty Ltd, Australia. Cyberspace Law: Commentaries and Materials: Yee Fen Lim , 2nd Edition.
2. Ian J. Lloyd ,(2017), ISSSSN formation Technology Law: (8 th Edition)
3. Karnika Seth, "Computers, Internet and New Technology Laws" ,Cyber Lawyer and Expert and is The Managing Partner of Seth Associates, Edition 2012.

REFERENCE BOOKS:

1. S.K.Verma, Raman mittal (2004), "Legal dimensions of cyber space" ,Indian Law Institute, New Delhi: Indian Institute,.
2. 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.
3. Jeff Kosseff (2017), "Cyber security Law", Wiley Publications,
4. Ian. J. Lyod (2014), "Information technology law" , Information Technology Act 2000, its amendment and IT Rules.

24PBCY81 MALWARE ANALYSIS AND REVERSE ENGINEERING LAB

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

This course aims to provide practical experience in analyzing and understanding various types of malware, including their infection vectors, behavior, and defense mechanisms. Students will learn techniques for sandboxing, static and dynamic analysis, unpacking malware, and reverse engineering executable files. By the end, students will be proficient in identifying, dissecting, and mitigating sophisticated malware threats in real-world scenarios.

LIST OF PROGRAMS

1. Experimentation on Initial Infection Vectors and Malware Discovery
2. Implementation on Sandboxing Malware and Gathering Information from Runtime Analysis
3. Implementation on Portable Executable (PE32) File Format
4. Implementation on Executable Metadata and Executable Packers
5. Experimentation on Malware Self - Defense, Compression, and Obfuscation Techniques
6. Experimentation on Malware behaviour analysis
7. Experimentation on analyzing Malicious Microsoft Office and Adobe PDF Documents
8. Experimentation on Mobile malware analysis
9. Experimentation on Packing and Unpacking of malware
10. Experimentation on Rootkit AntiForensics and Covert Channels
11. Experimentation on Modern Rootkit Analysis
12. Implementation on extract embedded resources (icons, payloads, config)

Total: 15 Hours

COURSE OUTCOMES:

CO1: Understand the various concepts of malware analysis and their technologies used.

CO2: Possess the skills necessary to carry out independent analysis of modern malware samples using both static and dynamic analysis techniques.

CO3: Understand the methods and techniques used by professional malware analysts.

CO4: To be able to safely analyze, debug, and disassemble any malicious software by malware analysis.

CO5: Understand the concept of Android malware analysis their architecture, and App development.

TEXT BOOKS:

1. Michael Sikorski and Andrew Honig (2012), “Practical Malware Analysis” by No Starch Press, ISBN: 9781593272906
2. Bill Blunden (2009), “The Rootkit Arsenal: Escape and Evasion in the Dark Corners of the System”, Second Edition, Jones & Bartlett Publishers,

REFERENCE BOOKS:

1. Jamie Butler and Greg Hoglund (2005), “Rootkits: Subverting the Windows Kernel”, Addison-Wesley Professional.
2. Bruce Dang, Alexandre Gazet, Elias Bachaalany, Sébastien Josse (2014.), "Practical Reverse Engineering: x86, x64, ARM, Windows Kernel, Reversing Tools, and Obfuscation",
3. Victor Marak (2015), "Windows Malware Analysis Essentials" Packt Publishing, O’Reilly,

24PBCY82 DATA SCIENCE USING R LAB

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES

The objective of the Data Science using R Programming course is to provide students with a comprehensive understanding of **R programming** for data analysis, statistical modeling, and visualization. The course aims to equip students with practical skills to work with **data structures**, perform **data manipulation**, implement **statistical techniques**, and create insightful **visualizations** for real-world data science applications.

LIST OF PROGRAMS

1. Download and install R-Programming environment and install basic packages using install. Packages () command in R.
2. Learn all the basics of R-Programming (Data types ,Variables , Operators etc.)
3. Implement R-Loops with different examples.
4. Learn the basics of functions in R and implement with examples.
5. Implement data frames in R. Write a program to join columns and rows in a data frame using c bind () and r bind () in R.
6. Implement different String Manipulation functions in R.
7. Implement different data structures in R (Vectors ,Lists ,Data Frames)
8. Write a program to read acsv file and analyze the data in the file in R
9. Create pie charts and bar charts using R.
10. Create a data set and do statistical analysis on the data using R.
11. Write R program to find Correlation and Covariance
12. Write R program for Regression Modeling

Total: 15 Hours

COURSES OUTCOMES:

CO1: Understand the concepts and applications of **Data Science** and its lifecycle across various fields.

CO2: Gain proficiency in **R Programming** basics, including data structures, operators, and control structures.

CO3: Develop expertise in working with **matrices, lists, data frames**, and handling missing values in R.

CO4: Perform **exploratory data analysis** (EDA) and **data preprocessing**, including descriptive statistics and data visualization in R.

CO5: Apply **inferential statistics** and **linear regression techniques** for data analysis, and implement multiple linear regression in R

TEXT BOOKS:

1. Jeeva Jose, Khanna Publishing House (2024)., "Beginner's Guide for Data Analysis using R Programming".
2. Nina Zumel, John Mount (2014), "Practical Data Science with R", Manning Publications,
3. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman (2014), "Mining of Massive Datasets",Cambridge University Press.
4. Mark Gardener (2012), "Beginning R - The Statistical Programming Language", John Wiley & Sons, Inc.,

REFERENCE BOOKS

1. W. N. Venables, D. M. Smith and the R Core Team (2013), "An Introduction to R",
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta (2014), "Practical Data Science Cookbook", Packt Publishing Ltd.
3. Nathan Yau (2011) "Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics", Wiley,
4. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich (2015), "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071.

DISCIPLINARY SPECIFIC ELECTIVE COURSES

24DBCY11 FUNDAMENTALS OF COMPUTING

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To introduce the fundamental concepts of Computers, Hardware, Software and able to interact with documentation, PowerPoint, Spreadsheet and Database.

UNIT I INTRODUCTION TO COMPUTERS -COMPUTER: 9

Definition, Characteristics of Computers, Basic Applications of Computer, Generations of computers. Components of Computer System: Central Processing Unit (CPU), input/output Devices, computer Memory: primary and secondary memory, magnetic and optical storage devices, Concepts of Hardware and Software. Data processing: concepts of data processing, Definition of Information and data, Basic data types, Storage of data/Information as files, Representation of data/Information.

UNIT II WORD PROCESSING-MS WORD 9

Word Processing Basic: An Introduction to Word Processing and MS-Word, working with documents, using tables, pictures, and charts, using mail merge and sending a letter to a group of people, creating form letters and labels, collaborating with workgroups, modifying a report, macros.

UNIT III - ELECTRONICS SPREADSHEET 9

Elements of Electronics Spread Sheet and Ms-Excel: - Entering, Editing and Formatting Data, Formatting Numbers, Managing Worksheets, Modifying Rows and Columns, Changing Views, AutoFill and Custom Lists, Conditional Formatting, Tables, Data Tools, Functions: Using functions: mathematical, statistical and financial function - Ranges and Dates, Lookups, Conditional Logic, Text Formulas, Introduction to Charts, Formatting Charts, Adding Graphics to Spreadsheets, Outline, Sort, Filter, and Subtotal, PivotTables, Protecting Data

UNIT IV PRESENTATION SOFTWARE- MS-POWERPOINT 9

Creating and enhancing a presentation, creating and publishing a web presentation, modifying a presentation, working with visual elements, delivering a presentation and designing a template.

UNIT V INTRODUCTION TO DATA BASE: 9

Working with databases: using the database wizard, working with datasheets, moving between

records and files, using goto, updating records, selecting rows and columns, changing column width, saving and exiting a datasheet. Working with tables: Creating a new database, adding tables to database, adding fields to tables, inserting a field, setting a primary key, adding and sorting records, setting relationships. Creating reports, forms and queries, using wizard and design view

Total: 45 Hours

COURSE OUTCOMES:

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

CO-1: Know about Parts of Computer such as storage devices along with input and output devices and Memory management.

CO-2: Select and Create word document, Leaning the formatting skills on paragraphs, tables, lists, and pages.

CO-3: Learning the use and utility of functions and formulas on excel spreadsheet.

CO-4: Create slide presentations that include text, graphics, animation, and transitions.

CO-5: Designing and building database with related tables in datasheet view or by using the table wizard

TEXT BOOKS:

1. Goe1, A.,2010 Computer Fundamentals, Pearson Education
2. Joan Lambert & Curtis Frye (2021), Microsoft Excel Step by Step, Microsoft Press.
3. Joan Lambert (2021), Microsoft Word Step by Step, Microsoft Press.
4. Curtis Frye , Joan Lambert (2022), Microsoft Office Step by Step (Office 2021 and Microsoft 365) Paperback – Import.

REFERENCE BOOKS:

1. E. Balagurusamy (2019), Computer Fundamentals & Programming in C, McGraw-Hill
2. Prof. Satish Jain, M. Geetha, Kratika : Office 2010 Training Guide:
3. P.K. Sinha & Priti Sinha (2010), Computer Fundamentals, BPB Publications.
4. E. Balagurusamy (2019), Computer Fundamentals & Programming in C, McGraw-Hill

24DBCY12 **DIGITAL LOGIC FUNDAMENTALS**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To understand the concept of digital systems, to operate on various Number systems and simplify Boolean functions and to distinguish logical and combinational circuits.

UNIT I NUMBER SYSTEM AND CODES 9

Binary-why it is so important in computers? – Conversions: binary to decimal – decimal to binary – octal – Hexa decimal – ASCII code –Excess-3 Code – Gray Code –Gates: OR gates – AND gates – Boolean Algebra – NOR gates – NAND gates.

UNIT II BOOLEAN ALGEBRA 9

Boolean Law and theorems –sum of product method – K-Map truth tables – Pairs, Quads, Octets – K-Map simplifications – Don't care – product of sum method – product of sum simplifications.

UNIT III COMBINATIONAL LOGIC CIRCUIT 9

Multiplexers –Demultiplexers – Decoders – Encoders – Code Converters – Parity Generators & Checkers – PAL – PLA.

UNIT IV SEQUENTIAL LOGIC CIRCUITS I 9

Sequential Logic: RS, JK, D and T Flip-Flops – Edge-Triggered – Master – Slave Flip- Flops. Registers: Shift Registers – Types of Shift Registers

UNIT V SEQUENTIAL LOGIC CIRCUITS II 9

Types of ROMs - Types of RAMs -Counters: Asynchronous Counters- Ripple – Synchronous Counters – Shift Counters.

Total: 45 hours

COURSE OUTCOMES:

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

CO-1: Evaluate various types of K-Map simplification

CO-2: Analyze Boolean Algebra concepts

CO-3: Apply De-Morgan's law

CO-4: Understand the concepts of sequential logic circuits

CO-5: Understand the concepts of number system

TEXT BOOKS:

1. D.P. Leach & A.P. Malvino (2002), Digital Principles and Application, THM Fifth Edition.
2. Digital Principles and Applications by D.P. Leach & A.P. Malvino (5th Ed, 2002) → Good reference, but edition is older so may not include HDL tools and modern FPGA contexts.
3. Digital Logic and Computer Design by M. Morris Mano (2001) → Classic text, though older. There are later international editions (2016, 2017) noted.

REFERENCE BOOKS:

1. M.M. Mano (2001), Digital Logic and Computer Design, PHI
2. T.C. Bartee (1991), Digital Computer Fundamentals, 6th Edition, Tata McGraw Hill.
3. Donald D.Givone (2004), Digital Principles and Design – Tata McGraw – Hill Publishing Company Limited .
4. Digital Principles and Design by Donald D. Givone (2004) → Still decent, but again older

WEB RESOURCES:

1. www.tutorialspoint.com/computer_logical_organization
2. www.geeksforgeeks.org/digital-electronics-logic-design-tutorials

24DBCY21 **DATA STRUCTURES AND ALGORITHMS**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To familiarize the students with linear and nonlinear data structures, to understand sorting and searching, to manipulate the complexity of data structures using asymptotic notations and to apply the data structures in solving problems.

UNIT I INTRODUCTION TO DATA STRUCTURES 12

Introduction to Data Structures- Why Data Structures – Operations of Data Structures – Data Types – Arrays and Lists – Representation of Arrays – Operations On Arrays - Abstract Data Types (ADTs) – List ADT.

UNIT II LINEAR DATA STRUCTURES 12

Stack: Operations of Stack – Representation – Implementation – Infix to Postfix Conversion – Postfix Evaluation–Recursion–Maze Problem–Queue: Operations of Queue–Representation– Implementation– Job Processing using Queue – Circular Queue – Double Ended Queue – Linked List: Representation – Implementation– Polynomial Addition– Doubly Linked List– Circular List– Circular Doubly Linked List.

UNIT III NON-LINEAR DATA STRUCTURES 12

Non-Linear Data Structures – Trees: Terminologies in Trees – Representation – Types of Trees – Forest – Transforming Forest into Binary Trees - Traversal Techniques – Applications of Trees – Graphs: Terminologies in Graphs – Representation – Depth First Search – Breadth First Search – Applications of Graphs – Shortest Path- Travelling Salesman Problem – Dijkstra's Algorithm – Types of Graphs.

UNIT IV SORTING AND SEARCHING 12

Sorting: Bubble Sort – Selection Sort – Merge Sort – Insertion Sort – Quick Sort – Heap Sort – Searching: Linear Search – Binary Search – Divide and Conquer – Hashing - Hash Table – Direct Address Method – Mapping Function – Handling Collision.

UNIT V COMPLEXITY AND CASE STUDIES 12

Asymptotic Notation – Big Oh Notation – Omega Notation – Tita Notation – Complexity: Space Complexity – Time Complexity – Space and Time Complexities of Data Structures – Case Studies: Searching for Patterns- Inventing a new sorting Algorithm - Synthesizing Concurrent Graph Data Structures.

Total: 60 Hours

COURSE OUTCOMES:

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

CO-1: Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.

CO-2: Describe the hash function and concepts of collision and its resolution methods.

CO-3: Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

CO-4: Correctly use recursion to solve a problem with a binary search tree or graph.

CO-5: Apply or create suitable algorithm to solve a particular problem.

TEXT BOOKS:

1. Gav Pai (2017), "Data structures and algorithms, concepts, techniques and Applications", McGraw Hill, ISBN –9780070667266.
2. E.Horowitz and S.Shani (2009) , "Fundamentals of Data Structures in C++", Galgotia Pub.

REFERENCE BOOKS:

1.Horowitz, S.Sahni,and S.Rajasekaran (2012)," Computer Algorithms", Galgotia Pub.Pvt.Ltd.

2.R.Kruse, C.L.Tondoand B.Leung, (1997),"Data Structures and Program designing C", PHI.

WEB RESOURCES:

1. https://www.tutorialspoint.com/data_structures_algorithms
2. https://www.javatpoint.com/data-structure-tutorial
3. https://www.edx.org/learn/data-structures

24DBCY22 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals, not on providing a mastery of specific software tools or programming environments. Assigned projects promote a 'hands-on' approach for understanding, as well as a challenging avenue for exploration and creativity.

UNIT I INTRODUCTION 12

What is AI? – AI Problems – What is an AI technique – Defining the problem as a state space search – Production system - Production system – Characteristics – Problem Characteristics, Problem Solving Approach to Typical AI problems

UNIT II HEURISTIC SEARCH TECHNIQUES 12

Generate and test – Hill Climbing – Best first Search – Problem Reduction – Constraints Satisfaction – Means end analysis

.

UNIT III KNOWLEDGE REPRESENTATION 12

Representations and Mappings – Approaches to Knowledge Representation. Using predicate Logic: Representing simple facts in logic – Computable functions and prediction – Resolution – The basic of resolution – Resolution in Propositional Logic – The Unification algorithm – Resolution in Predicate Logic.

UNIT IV OPTIMIZATION AND GAME PLAYING 12

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

UNIT V SOFTWARE AGENTS AND APPLICATIONS 12

Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems- AI

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

Total: 60 Hours

COURSE OUTCOMES:

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

CO-1: Ability to apply Artificial Intelligence techniques for problem solving.

CO-2: Apply searching methods to solve a problem in different perspective.

CO-3: Understand Knowledge representation techniques for propositional logic and predicate logic.

CO-4: Analyze and apply principles to solve optimization problems, and develop various games using Artificial Intelligence

CO-5: Explain how Artificial Intelligence enables capabilities that are beyond Conventional technology, Intelligent Agents and Robots.

TEXT BOOKS:

1. Artificial Intelligence: Foundations of Computational Agents: Published 2023, Cambridge University Press — a strong recent foundational text. artint.info
2. Introduction to Artificial Intelligence (2023): A modern introduction book (2023 edition) good for newer curricula.
3. Artificial Intelligence: A Modern Approach: The original classic edition (still used), for foundational theory.2023

REFERENCE BOOKS:

1. Artificial Intelligence (A-W Series in Computer Science): A series text, likely more concise and newer edition.
2. Artificial Intelligence 2023: Very recent overview/overview-style AI text (2023).
3. The foundational text by Poole & Mackworth (2023) is explicitly noted as "undergraduate and graduate students … linked theory and experiment.".

WEB RESOURCES:

1. https://www.cyberralegalservices.com/detail-casestudies.php.

L	T	P	O	C
3	0	0	2	3

24DBCY31 FOUNDATION OF DATA SCIENCE

COURSE OBJECTIVES:

It is designed to provide students with a solid grounding in essential concepts and skills necessary for understanding and applying data science principles. Students will be introduced to the fundamentals of data collection, cleaning, and exploration, gaining proficiency in techniques for preparing data for analysis.

UNIT I INTRODUCTION 9

Data Science: Benefits and uses – facets of data – Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation – Exploratory Data analysis – build the model– presenting findings and building applications – Data Mining – Data Warehousing – Basic Statistical descriptions of Data

UNIT II DESCRIBING DATA 9

Types of Data – Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages – Describing Variability – Normal Distributions and Standard (z) Scores

UNIT III DESCRIBING RELATIONSHIPS 9

Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of r2 –multiple regression equations –regression towards the mean.

UNIT IV PYTHON LIBRARIES FOR DATA WRANGLING 9

Basics of NumPy arrays –aggregations –computations on arrays –comparisons, masks, Boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables.

UNIT V DATA VISUALIZATION 9

Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour

plots – Histograms – legends – colors – subplots – text and annotation – customization – three-dimensional plotting – Geographic Data with Basemap – Visualization with Seaborn.

TOTAL: 45 Hours

TEXTBOOKS:

1. "Data Science from Scratch: First Principles with Python" – *Joel Grus*, 2nd Edition, 2019
2. "Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow" – *Aurélien Géron*, 3rd Edition, 2023
3. "Foundations of Data Science" – *Avrim Blum, John Hopcroft, Ravi Kannan*, 2020
4. "Data Science for Beginners" – *Andrew Park*, 2021
5. "Python Data Science Handbook" – *Jake VanderPlas*, 2nd Edition, 2023

REFERENCE BOOKS:

1. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython by Wes McKinney — 2017 (2nd Ed) O'Reilly Media+2Goodreads+2
2. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data by Hadley Wickham & Garrett Grolemund — 2017 (1st Ed) Amazon+1
   (Note: 2nd Edition published 2023) O'Reilly Media+1
3. An Introduction to Statistical Learning: With Applications in R by Gareth James, Daniela Witten, Trevor Hastie & Robert Tibshirani — 2013 Google Books+1
4. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking by Foster Provost & Tom Fawcett — 2013 ResearchGate+1
5. Big Data: Principles and Best Practices of Scalable Real-Time Data Systems by Nathan Marz & James Warren — 2015.

WEB RESOURCES:

1. https://ocw.mit.edu/search/?q=data+science
2. https://developers.google.com/machine-learning/crash-course
3. https://ocw.mit.edu/search/?q=data+science
4. https://www.edx.org/learn/data-science

24DBCY32 SOFTWARE QUALITY ASSURANCE

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

This course introduces the basic concepts of Software Quality Control and Assurance with different quality measures and standards for real time software projects as case studies.

UNIT I INTRODUCTION 9

Quality and the quality system - standards and procedures technical activities. Software tasks - management responsibility - quality system - contract review - design control - document control - purchasing product identification and traceability.

UNIT II PROCESS CONTROL 9

Checking - Identification of Testing Tools - Control of Nonconforming Product - Corrective Action- Verification: Verification techniques – Inspections, reviews, walk-throughs – Case studies.

UNIT III QUALITY AUDITS 9

Handling, Storage, Packing and Delivery - Quality Records - Internal Quality Audits - Training - Servicing - Statistical Techniques-Views On Quality – Cost Of Quality - Quality Models – Quality Frameworks – Verification And Validation – Defect Taxonomy – Defect Management – Statistics And Measurements – IEEE Standards – Quality Assurance And Control Processes.

UNIT IV QUALITY ASSURANCE TECHNOLOGIES 9

QA And New Technologies - QA and Human - Computer interface - Process Modeling - Standards and Procedures- Coverages: Block, Conditions, Multiple Conditions, MC/DC, Path – Data Flow Graph – Definition and Use Coverages – C-Use, P-Use, Def clear, Def-Use – Finite State Machines – Transition Coverage.

UNIT V INDIAN STANDARDS 9

ISO–ISO Standards-Development Process-ISO Certification-ISO Consulting Services and Consultants-E-Business- 9001 - Elements of ISO 9001 - Improving Quality System - Case Study.

Total : 45 hours

COURSE OUTCOMES:

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

CO-1: Learn about Software Quality Management – Quality Factors, components and Plans.

CO-2: To explore the different verification techniques for software development.

CO-3: To understand Software Quality Audits and illustrate Quality frameworks concepts.

CO-4: To gain knowledge about the various Software Testing Coverages.

CO-5: To Understand the Strategic about various quality standards to assess the software.

TEXT BOOKS:

1. Claude Y. Laporte, Alain April, "Software Quality Assurance", Wiley-IEEE Computer Society Press, 2018.
2. Watts S. Humphrey, "Managing the software process", Addison Wesley, 1999.
3. Tsum S.Chow, "Software Quality Assurance a Practical Approach", IEEE Computer Society press, 1985.
4. Roger S. Pressman, " Software Engineering - A Practitioner's approach", McGraw Hill, 8th Edition,2019.

REFERENCE BOOKS:

1. sum S. Chow (1985) Software Quality Assurance: A Practical Approach – IEEE Computer Society Press.
2. Roger S. Pressman (2019), Software Engineering: A Practitioner's Approach – McGraw-Hill, 8th Edition.

WEBSITE RESOURCES

1. https://www.cprime.com/resources/blog/
2. https://techbeacon.com/app-dev-testing
3. https://www.browserstack.com/guide

24DBCY41 **INTERNET OF THINGS**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To understand the fundamentals of Internet of Things and to apply the concept in Real World Scenario.

UNIT I OVERVIEW 12

IoT- An Architectural Overview- Building an architecture - Main design principles and needed capabilities - An IoT architecture outline - Standards considerations.

UNIT II M2M AND IOT TECHNOLOGY FUNDAMENTALS 12

Devices and gateways- Local and wide area networking- Data management- Business processes in IoT- Everything as a Service (XaaS) - M2M and IoT Analytics- Knowledge Management.

UNIT III REFERENCE BOOKS ARCHITECTURE 12

Introduction - IoT REFERENCE BOOKS Model - IoT REFERENCE BOOKS Architecture - Functional View- Information View- Deployment and Operational View- Other Relevant architectural views.

UNIT IV REAL-WORLD DESIGN CONSTRAINT 12

Introduction- Technical Design constraints - Data representation and visualization, Interaction and remote control. IoT systems management - IoT Design Methodology - specifications - Integration and Application Development.

UNIT V CASE STUDY 12

Various Real time applications of IoT- Connecting IoT to cloud - Cloud Storage for IoT - Data Analytics for IoT - Software & Management Tools for IoT.

Total : 60 hours

COURSE OUTCOMES:

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

CO-1: To assess the vision and introduction of IoT and understand IoT Market perspective.

CO-2: To Implement Data and Knowledge Management and use of Devices in IoT technology.

CO-3: To understand where the IoT concept fits within the broader ICT industry and possible future Trends

CO-4: To Understand and be able to explain the role of big data, cloud computing and data analytics in a typical IoT system

CO-5 : Able to understand building blocks of Internet of Things and characteristics.

TEXT BOOKS:

1. Cuno Pfister (2011), *Getting Started with the Internet of Things*, O'Reilly Media.
2. Ovidiu Vermesan & Peter Friess (2014), *Internet of Things: From Research and Innovation to Market Deployment*, River Publishers.
3. Yasser Ismail (2020), *Internet of Things (IoT): Concepts and Applications*, CRC Press.

REFERENCE BOOKS:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle (2014).
2. Peter Waher (2015) (Correct recent edition year — not 2005)Learning Internet of Things PACKT Publishing, Birmingham & Mumbai.(Published originally in 2015).
3. Arshdeep Bahga, Vijay Madisetti (2014) (Correct standard publishing year — not 2012) Internet of Things: A Hands-On Approach Universities Press.

WEBSITE RESOURCES:

1. https://internetofthingsagenda.techtarget.com/
2. https://www.cisco.com/c/en/us/solutions/internet-of-things/overview.html
3. https://www.researchgate.net/topic/Internet-of-Things

24DBCY42 **CLOUD COMPUTING**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

This course introduces the fundamental concepts of cloud computing model for enabling ubiquitous, convenient access to shared pool of configurable computing resources and storage solutions over a network.

UNIT I CLOUD COMPUTING 12

History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing– Companies in the Cloud Today – Cloud Services.

UNIT II WEB-BASED APPLICATION 12

Pros and Cons of Cloud Service Development – Types of Cloud Service Development– Software as a Service – Platform as a Service – Web Services – On- Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds

UNIT III CENTRALIZING EMAIL COMMUNICATIONS 12

Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events for the Corporation.

UNIT IV COLLABORATING ON TASK MANAGEMENT 12

Exploring Online Scheduling Applications –Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases– Storing and Sharing Files

UNIT V COLLABORATING VIA WEB-BASED COMMUNICATION TOOLS 12

Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis

Total: 60 Hours

COURSE OUTCOMES:

CO1 : Ability to understand architecture and concepts of different cloud models.

CO2: Capable of creating applications by utilizing cloud platforms.

CO3: Understand how to provide the appropriate cloud computing solutions and recommendations according to the applications used.

CO4: Explore cloud computing driven commercial systems such as Google Apps and Microsoft Azure.

CO5: To build private cloud.

TEXT BOOKS:

1. Thomas Erl, Ricardo Puttini, Zaigham Mahmood (2024), "Cloud Computing: Concepts, Technology & Architecture".
2. Douglas E. Comer (2021), "The Cloud Computing Book: The Future of Computing Explained"

REFERENCE BOOKS:

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi (2024), "Mastering Cloud Computing: Foundations and Applications Programming"
2. Cloud computing with Windows Azure platform, Jennings, Roger, PHI, 2009.

WEB RESOURCES

1. https://www.geeksforgeeks.org/cloud-computing/
2. https://aws.amazon.com/what-is-cloud-computing/

24DBCY51 **ROBOTIC PROCESS AUTOMATION**

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

The students able to understand the basic concepts of Robotic Process Automation. o expose to the key RPA design and development strategies and methodologies. To learn the fundamental RPA logic and structure. To explore the Exception Handling, Debugging and Logging operations in RPA.

UNIT I INTRODUCTION TO ROBOTIC PROCESS AUTOMATION 12

Emergence of Robotic Process Automation (RPA), Evolution of RPA, Differentiating RPA from Automation - Benefits of RPA - Application areas of RPA, Components of RPA, RPA Platforms. Robotic Process Automation Tools - Templates, User Interface, Domains in Activities, Workflow Files.

UNIT II AUTOMATION PROCESS ACTIVITIES 12

Sequence, Flowchart & Control Flow: Sequencing the Workflow, Activities, Flowchart, Control Flow for Decision making. Data Manipulation: Variables, Collection, Arguments, Data Table, Clipboard management, File operations Controls: Finding the control, waiting for a control, Act on a control, UIExplorer, Handling Events.

UNIT III APP INTEGRATION, RECORDING AND SCRAPING 12

App Integration, Recording, Scraping, Selector, Workflow Activities. Recording mouse and keyboard actions to perform operation, scraping data from website and writing to CSV. Process Mining.

UNIT IV EXCEPTION HANDLING AND CODE MANAGEMENT 12

Exception handling, Common exceptions, Logging- Debugging techniques, collecting crash dumps, Error reporting. Code management and maintenance: Project organization, Nesting workflows, Reusability, Templates, Commenting techniques, State Machine.

UNIT V DEPLOYMENT AND MAINTENANCE 12

Publishing using publish utility, Orchestration Server, Control bots, Orchestration Server to deploy bots, License management, Publishing and managing updates. RPA Vendors - Open-Source RPA, Future of RPA.

Total: 45 Hours

COURSE OUTCOMES:

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

CO-1: Enunciate the key distinctions between RPA and existing automation techniques and **platforms**.

CO-2: Use UIPath to design control flows and work flows for the target process

CO-3: Implement recording, web scraping and process mining by automation

CO-4: Use UlPath Studio to detect, and handle exceptions in automation processes.

CO-5: Implement and use Orchestrator for creation, monitoring, scheduling, and controlling of automated bots and processes. To learn to deploy and maintain the software bot.

TEXT BOOKS:

1. A Gerardus Blokdyk (2020), "Robotic Process Automation RPA A Complete Guide ".
2. Tom Taulli (2020), "The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems", Apress publications.
3. Frank Casale (Author), Rebecca Dilla (Author), Heidi Jaynes (Author), Lauren Livingston (Author) (2018.), Introduction to Robotic Process Automation: a Primer, Institute of Robotic Process Automation, Amazon Asia-Pacific Holdings Private Limited.

REFERENCE BOOKS :

1. Richard Murdoch (2018.) , Robotic Process Automation: Guide to Building Software Robots, Automate Repetitive Tasks & Become an RPA Consultant, Amazon Asia-Pacific Holdings Private Limited.
2. Alok Mani Tripathi (2018), "Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool – UiPath", Packt Publishing.

24DBCY52 **SOCIAL NETWORK SECURITY**

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

This course intends to develop semantic web related simple applications To explain Privacy and Security issues in Social Networking. To explain the data extraction and mining of social networks. To discuss the prediction of human behavior in social communities. To describe the Access Control, Privacy and Security management of social networks

UNIT I FUNDAMENTALS OF SOCIAL NETWORKING 12

Introduction to Semantic Web, Limitations of current Web, Development of Semantic Web, Emergence of the Social Web, Social Network analysis, Development of Social Network Analysis, Key concepts and measures in network analysis, Historical overview of privacy and security, Major paradigms, for understanding privacy and security

UNIT II SECURITY ISSUES IN SOCIAL NETWORKS 12

The evolution of privacy and security concerns with networked technologies, Contextual influences on privacy attitudes and behaviors, Anonymity in a networked world.

UNIT III EXTRACTION AND MINING IN SOCIAL NETWORKING DATA 12

Extracting evolution of Web Community from a Series of Web Archive, Detecting communities in social networks, Definition of community, Evaluating communities, Methods for community detection and mining, Applications of community mining algorithms, Tools for detecting communities social network infrastructures and communities, Big data and Privacy.

UNIT IV PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES 12

Understanding and predicting human behavior for social communities, User data Management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Awareness, Privacy in online social networks, Trust in online environment, What is Neo4j, Nodes, Relationships, Properties.

UNIT V ACCESS CONTROL, PRIVACY AND IDENTITY MANAGEMENT 12

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

COURSE OUTCOMES:

CO1: Develop semantic web related simple applications

CO2 : Address Privacy and Security issues in Social Networking

CO3: Explain the data extraction and mining of social networks

CO4: Discuss the prediction of human behavior in social communities

CO5: Describe the applications of social networks

Total: 60 Hours

TEXT BOOKS :

1. Peter Mika (2007), "Social Networks and the Semantic Web, First Edition, Springer.
2. BorkoFurht, "Handbook of Social Network Technologies and Application, First Edition, Springer, 2010.
3. Learning Neo4j 3.x "Second Edition By Jérôme Baton, Rik Van Bruggen, Packt publishing
4. David Easley, Jon Kleinberg, (2010), "Networks, Crowds, and Markets: Reasoning about a Highly Connected World‖, First Edition, Cambridge University Press.

REFERENCE BOOKS

1. Easley D. Kleinberg J (2010), "Networks, Crowds, and Markets – Reasoning about a Highly Connected World", Cambridge University Press,.
2. Jackson, Matthew O (2008.) , "Social and Economic Networks", Princeton University Press.

WEBSITE RESOURCES

1. https://www.w3.org/ — Official W3C resources for Semantic Web standards (RDF, OWL, SPARQL
2. https://schema.org/ — Semantic markup schemas used in modern web applications.
3. https://www.udacity.com/course/data-wrangling-with-mongodb--ud032 — Social data structuring

24DBCY61 **AUGMENTED REALITY**

L	T	P	O	C
4	0	0	2	4

URSE OBJECTIVES:

To impart the fundamental aspects and principles of AR/VR technologies. To learn about the graphical processing units and their architectures. To gain knowledge about AR/VR application development. To know the technologies involved in the development of AR/VR based applications.

UNIT I INTRODUCTION TO AUGMENTED REALITY 12

History of AR - Augmented reality characteristics – Difference between Augmented Reality and Virtual Reality – AR technological components – Technologies used in AR– Feature Extraction – Hardware components – AR devices – Importance of AR - Real world uses of AR – AR types – Software tools available for AR

UNIT II NEED OF TECHNOLOGIES FOR AUGMENTED REALITY 12

Hardware technology – virtual scenes – 3D objects – AR components – Display – HMD – Eyeglasses – Contact Lenses – significance of AR – AR powered devices – AR application development drawbacks – Compatibility - Performance – AR libraries– Motion tracking – Environmental understanding - Anchors

UNIT III TECHNOLOGY INTEGRATION AND IMPLEMENTATION OF AR 12

Technology use and integration in industrial settings– Assistive training to faculty members– Planning and administration for implementation – AR implications– Practical data – AR labs– Platforms to form AR content– Coordinated utilization of AR applications – Hands- on preparation

UNIT IV AUGMENTED REALITY AND VIRTUAL REALITY FOR MICRO LEARNING 12

Micro learning techniques– Utilizing VR for learning – VR for Practical online assessment– VR info graphics– Virtual case considerations - Utilizing AR for learning – Accessible learning – sensible data – elevated learner engagement - VR technology – Components of VR – VR Hardware – VR applications – Civil Engineering – Real Estate – Biology and Medicine– Virtual Mall – VR in Education – Virtual Laboratory – Factory Planning – Automobile Industry.

UNIT V TOOLS AND APPLICATIONS OF AUGMENTED REALITY 12

Tools available for Augmented Reality and Recognition – Software Tools – Google Poly – Unity – software approaches – recognition types – native software solutions – ARKit – AR Core – software development kit - Cloud services - AR business applications – weather prediction – market prediction – smart cities - AR application for Education - AR application for Healthcare sector – Agriculture – Civil Engineering – Architecture – Archaeology – Crime and Security – Games – IoT – Use cases – Social Media – Gaming – Education – Healthcare– Shopping and Business

TOTAL: 60 Hours.

COURSE OUTCOMES:

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

CO1: Understand the basic concepts of AR.

CO2: Understand the tools and technologies related to AR

CO3: Know the working principle and implementations of AR devices

CO4 : Design of various Virtual Reality Micro Learning techniques

CO5 : Develop AR applications in different domains.

TEXT BOOKS:

1. Augmented reality for education- A new technology for teaching and learning, 2020-Springer.
2. Ezgin Pelin Yildis (2021), Augmented Reality Research and Applications in Education- DOI:10.5772/intechopen.99356
3. Dieter Schmalstieg and Tobias Hollerer, "Augmented Reality: Principles and Practice"
4. "Understanding Augmented Reality: Concepts and Applications".
5. Alan B. Craig, "Augmented Human: How Technology is Shaping the New Reality" edited by Helen Papagiannis.
6. Charles Palmer, John Williamson (2018), “Virtual Reality Blueprints: Create compelling VR experiences for mobile”, Packt Publisher,

REFERENCE BOOKS:

1. Kaliraj P, Devi T (2021), “Innovating with Augmented Reality: Applications in Education and Industry” (P. Kaliraj, Ed.) (1st ed.), Auerbach Publications. https://doi.org/10.1201/9781003175896.

2. Dieter Schmalstieq, Tobias Hollerer (2016), “Augmented reality principles and practice” - Pearson education publications https://doi.org/10.1145/2897826.2927365

3. Augmented Reality Books: An Immersive Approach to Learning- Soham Mehta, Pratish Jain , Aayushi Vora, Abhijit Joshi, Harshal Dalvi, Information Technology Dwarkadas J. Sanghvi College of Engineering, Mumbai, India.

WEBSITE RESOURCES

1. https://www.blippar.com/build-ar/augmented-reality-education — “Augmented Reality in Education” by Blippar (2023) Blippar
2. https://www.angelaa-lee.medium.com/the-ultimate-guide-to-vr-and-ar-in-education-in-2024-supercharge-learning-with-actionable-steps-775fd24c6f91 — “The Ultimate Guide to VR and AR in Education in 2024” (2024) Medium
3. https://onlinecourses.swayam2.ac.in/nou24_ge37/preview — “Introduction to Virtual Reality” course on Swayam2 (start Jan 2024) onlinecourses.swayam2.ac.in
4. https://unity.com/resources/create-virtual-mixed-reality-experiences-unity — “Create virtual and mixed reality experiences in Unity” (June 2024) Unity

24DBCY62 **BIG DATA ANALYTICS**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To explore, design, and implement basic concepts of big data & analytics methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and its application to the business needs.

UNIT I INTRODUCTION TO BIGDATA 12

Introduction to Big Data Platform – Challenges of Conventional Systems - Nature of Data- Evolution Of Analytic Scalability - Intelligent data analysis- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools

UNIT II MINING DATA STREAMS 12

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing -Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Real time Analytics Platform (RTAP)Applications

UNIT III ADVANCED ANALYTICS 12

Analyzing, Visualization and Exploring the Data, Statistics for Model Building and Evaluation, Advanced Analytics - K-means clustering, Association rules-Speedup, Linear Regression, Logistic Regression, Naïve Bayes, Decision Trees, Time Series Analysis, Text Analysis

UNIT IV HADOOP AND FRAMEWORKS 12

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop - Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming - Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT V APPLICATIONS 12

Case study : Walmart - uber – Netflix – eBay -: Procter and Gamble – Travel and Tourism – Telcom Industry.

TOTAL: 60 Hours

COURSE OUTCOMES:

CO-1: Understand the fundamental concepts of big data platform and know about the basic concepts of nature and evolution of big data.

CO-2: Understand the data streams concepts and stream computing.

CO-3: Learn about the advanced analytics techniques to gain knowledge of latest techniques.

CO-4: Become skilled at analyzing, scaling and streaming of Hadoop.

CO-5: Understand the framework of Visual data analysis techniques, interaction techniques.

TEXTBOOKS ;

1. StephanKudyba, Big Data, Mining, and Analytics: 2014 Components of Strategic Decision Making,Auerbach Publications.
2. Michael Minelli (Author), Michele Chambers (Author),AmbigaDhiraj (Author),Big Data, Big Analytics: 2013 Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications.
3. Maheswari, " Data Analytics",McGraw Hill, 20171 st Edition,.
4. Jules J. Berman (2013), Principles of Big Data: Preparing, Sharing, and Analyzing Complex Information, Morgan Kaufmann.

REFERENCE BOOKS;

1. Viktor Mayer-Schönberger & Kenneth Cukier (2013), Big Data: A Revolution That Will Transform How We Live, Work, and Think, Houghton Mifflin Harcourt.
2. Rajkumar Buyya, Rodolfo Milito, Giuseppe Sapienza, Massimo Villari (2016), Big Data Principles and Paradigms, Morgan Kaufmann.
3. Anil Maheshwari (2017), Data Analytics Made Accessible, Kindle/Amazon Digital Services.
4. Thomas Erl, Wajid Khattak & Paul Buhler (2016), Big Data Fundamentals: Concepts, Drivers & Techniques, Prentice Hall.

WEBSITE RESOURCES

1. https://www.ibm.com/analytics/big-data
2. https://azure.microsoft.com/en-us/solutions/big-data
3. https://cloud.google.com/solutions/big-data
4. https://www.udemy.com/topic/big-data/

24DBCY71 MULTIMEDIA AND ITS APPLICATIONS

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

This course introduces the basic concepts of multimedia and its components such as text, Image, Video, Graphics and Animation.

UNIT I INTRODUCTORY CONCEPTS 12

Multimedia – Definitions, CD-ROM and the Multimedia Highway, Uses of Multimedia, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia, Multimedia skills and training, Training opportunities in Multimedia. Motivation for multimedia usage, Frequency domain analysis, Application Domain.

UNIT II MULTIMEDIA 12

Hardware and Software: Multimedia Hardware – Macintosh and Windows production Platforms, Hardware peripherals – Connections, Memory and storage devices, Media software – Basic tools, making instant multimedia, Multimedia software and Authoring tools, Production Standards.

UNIT III MULTIMEDIA MAKING IT WORK 12

Multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression: Different algorithms concern to text, audio, video and images etc., Working Exposure on Tools like Dream Weaver, Flash, Photoshop Etc.

UNIT IV MULTIMEDIA AND THE INTERNET 12

History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW – Web Servers, Web Browsers, Web page makers and editors, Plug-Ins and Delivery Vehicles, HTML, VRML, designing for the WWW – Working on the Web, Multimedia Applications – Media Communication, Media Consumption, Media Entertainment, Media games.

UNIT V MULTIMEDIA-LOOKING TOWARDS FUTURE 12

Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital

Radio, Multimedia Conferencing, Assembling and delivering a project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM technology.

Total : 60 Hours

COURSE OUTCOMES:

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

CO-1: Understand fundamentals of multimedia, media and data streams, sound/audio, image, graphics, video and animation.

CO-2: Study about Multimedia operating system issues such as real-time operation, resource management, process management, file systems, and Multimedia networking.

CO-3: Multimedia synchronization, presentation requirements, REFERENCE BOOKS model, and **sy**nchronization techniques.

CO-4: Gain knowledge about Multimedia database issues such as data organization, indexing and retrieval.

CO-5: Implement conferencing paradigms, structured interaction support, and know about examples from video/audio/graphics conferencing.

TEXTBOOKS:

1. S. Heath (1999.), "Multimedia & Communication Systems", Focal Press, UK.,
2. R.Steinmetz and K. Naharstedt, "Multimedia: Computing, Communications & Applications", Pearson, Delhi, 2014.

REFERENCE BOOKS:

1. Ralf Steinmetz & Klara Nahrstedt (2014), "Multimedia: Computing, Communications & Applications", Pearson, Delhi.
2. Tay Vaughan (2014), "Multimedia: Making It Work", 9th Edition, Tata McGraw Hill, New Delhi.
3. K. Andleigh & K. Thakkar (2000), "Multimedia System Design", PHI, New Delhi.
4. R.S. Pressman (1999), "Multimedia and Communication Systems", Focal Press, UK.

WEBSITE RESOURCES

1. **https://www.tutorialspoint.com/multimedia/index.htm**
2. https://www.geeksforgeeks.org/multimedia-systems/
3. https://www.javatpoint.com/multimedia.
4. **https://www.w3schools.com/html/html5_video.asp**
5. **https://developer.mozilla.org/en-US/docs/Web/Media**

24DBCY72 COGNITIVE COMPUTING

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To simulate human thought processes in a computerized model. Using self-learning algorithms that use data mining, pattern recognition and natural language processing, the computer can mimic the way the human brain works.

UNIT I COGNITIVE COMPUTING 12

Foundation of Cognitive Computing: cognitive computing as a new generation, the uses of cognitive systems, system cognitive, gaining insights from data, Artificial Intelligence as the foundation of cognitive computing, understanding cognition

Design Principles for Cognitive Systems:

Components of a cognitive system, building the corpus, bringing data into cognitive system, machine learning, hypotheses generation and scoring, presentation and visualization services

UNIT II SUPPORT OF A COGNITIVE SYSTEM 12

Natural Language Processing in support of a Cognitive System: Role of NLP in a cognitive system, semantic web, Applying Natural language technologies to Business problems **Representing knowledge in Taxonomies and Ontologies:** Representing knowledge, Defining Taxonomies and Ontologies, knowledge representation, models for knowledge representation, implementation considerations

UNIT III ADVANCED ANALYTICS 12

Relationship between Big Data and Cognitive Computing : Dealing with human-generated data, defining big data, architectural foundation, analytical data warehouses, Hadoop, data in motion and streaming data, integration of big data with traditional data

Applying Advanced Analytics to cognitive computing: Advanced analytics is on a path to cognitive computing, Key capabilities in advanced analytics, Using advanced analytics to create value, Impact of open source tools on advanced analytics

UNIT IV BUSINESS IMPLICATIONS 12

The Business Implications of Cognitive Computing : Preparing for change ,advantages of new disruptive models , knowledge meaning to business, difference with a cognitive systems approach , meshing data together differently, using business knowledge to plan for the future , answering business questions in new ways , building business specific solutions , making cognitive computing a reality , cognitive application changing the market

The process of building a cognitive application:

Emerging cognitive platform, defining the objective, defining the domain, understanding the intended users and their attributes, questions and exploring insights, training and testing

UNIT V APPLICATION 12

Building a cognitive health care application: Foundations of cognitive computing for healthcare, constituents in healthcare ecosystem, learning from patterns in healthcare Data, Building on a foundation of big data analytics, cognitive applications across the health care eco system, starting with a cognitive application for healthcare, using cognitive applications to improve health and wellness, using a cognitive application to enhance the electronic medical record Using cognitive application to improve clinical teaching

Smarter cities-Cognitive Computing in Government: cities operation, characteristics of smart city, rise of open data movement with fuel cognitive cities, internet of everything and smarter cities, understanding the owner ship and value of data, cities are adopting smarter technology today for major functions, smarter approaches to preventative healthcare, building a smarter transportation infrastructure using analytics to close workforce skills gap, creating a cognitive community infrastructure, next phase of cognitive cities

TOTAL: 60 Hours

TEXTBOOKS:

1. Judith H Hurwitz, Marcia Kaufman, Adrian Bowles , "Cognitive computing and Big Data Analytics" , Wiley 2015.
2. Wang, Y. (2007e). On the Cognitive Processes of Human Perception with Emotions, Motivations, and Attitudes. International Journal of Cognitive Informatics and Natural Intelligence, 1(4), 1-13
3. Wang, Y. (2008), "On Contemporary Denotational Mathematics for Computational Intelligence", Transactions of Computational Science, Vol. 2, pp. 6-29.

REFERENCE BOOKS:

1. Wang, Y. (2007f). The Theoretical Framework and Cognitive Process of Learning. Proc. 6th International Conference on Cognitive Informatics (ICCI'07), (pp. 470-479). IEEE CS Press.
2. Wang, Y. (2007g). Formal Description of the Mechanisms and Cognitive Process of Memorization. Proc. 6th International Conference on Cognitive Informatics (ICCI'07), (pp. 284-293). IEEE CS Press.
3. Wang, Y. (2008a). Keynote, On Abstract Intelligence and Its Denotational Mathematics Foundations, Proc. 7th IEEE International Conference on Cognitive Informatics (ICCI'08), (pp. 3-13). Stanford University, CA, USA, IEEE CS Press.
4. Wang, Y. (2008b). On Contemporary Denotational Mathematics for Computational Intelligence. Transactions of Computational Science, 2, 6-29.
5. Wang, Y. (2008c). On Concept Algebra: A Denotational Mathematical Structure for Knowledge and Software Modeling. International Journal of Cognitive Informatics and Natural Intelligence, 2(2), 1-18.

WEBSITE RESOURCES

1. https://www.ibm.com/topics/cognitive-computing
2. https://www.geeksforgeeks.org/cognitive-computing/
3. https://www.analyticsvidhya.com/blog/tag/cognitive-computing/
4. https://www.techtarget.com/searchenterpriseai/definition/cognitive-computing
5. https://www.researchgate.net/topic/Cognitive-Computing

24DBCY81 **GREEN COMPUTING**

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES :

To study about existing green computing strategies Fundamental challenges in achieving green operations of computing units Assess enterprise-wide and personal computing related energy consumption.

UNIT I FUNDAMENTALS **12**

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

UNIT II GREEN ASSETS AND MODELING **12**

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

UNIT III GRID FRAMEWORK **12**

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

UNIT IV GREEN COMPLIANCE **12**

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

UNIT V CASE STUDIES **12**

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for

Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

TOTAL: 60 Hours.

COURSE OUTCOMES:

CO1: Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.

CO2: Enhance the skill in energy saving practices in their use of hardware.

CO3: Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders.

CO4: Understand the ways to minimize equipment disposal requirements.

CO5: Apply case studies in real time applications.

TEXT BOOKS:

1. Samir Kumar Bandopadhyay (2018), "Green Computing", PHI Learning.
2. San Murugesan & G.R. Gangadharan (2012), "Harnessing Green IT: Principles and Practices", Wiley.
3. Bud E. Smith (2013), "Green Computing Tools and Techniques: Computer-Aided Technologies", CRC Press.

REFERENCE BOOKS:

1. Alin Gales, Michael Schaefer & Mike Ebbers (2011), "Green Data Center: Steps for the Journey", Shroff/IBM Redbook.
2. John Lamb (2009), "The Greening of IT", Pearson Education.
3. Jason Harris (2008), "Green Computing and Green IT – Best Practices on Regulations & Industry", Lulu.com.
4. Carl Speshock (2010), "Empowering Green Initiatives with IT", John Wiley & Sons.
5. Wu Chun Feng (2019), "Green Computing: Large Scale Energy Efficiency", CRC Press.

WEBSITE RESOURCES:

1. https://www.ibm.com/topics/green-it
2. https://www.intel.com/content/www/us/en/environment/green-computing.html
3. https://www.microsoft.com/en-us/sustainability
4. https://sustainability.google/tech/
5. https://www.hp.com/us-en/hp-information/sustainable-impact.html

24DBCY82 **DESIGN THINKING**

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

Inculcate the fundamental concepts of design thinking. Develop the students as a good designer by imparting creativity and problem-solving ability. Conceive, conceptualize, design and demonstrate innovative ideas using prototypes

UNIT-1 : DESIGN THINKING PROCESS 12

Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, the need of design thinking; An approach to design thinking, Design thinking Process model, Design thinking tools.

UNIT II: EMPATHIZE AND DEFINE 12

Design thinking phases, how to empathize, Role of empathy in design thinking, the purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools: Customer Journey Map, Personas.

UNIT III: IDEATION 12

Challenges in idea generation, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Create Thinking, Generating Design Ideas, Lateral Thinking, Analogies, Brainstorming, Mind mapping, National Group Technique, Synectic's, Development of work, Analytical Thinking, Group Activities. Ideation Tools: How Might We? (HMW), Storyboard, Brainstorming.

UNIT I V: PROTOTYPING 12

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype.

UNIT V: TESTING PROTOTYPES 12

Prototyping for digital products: What's unique for digital products, Preparation; Prototyping for hysical products: What's unique for physical products, Preparation; Testing prototypes with

users. Create a Pitch-Plan for scaling up-Road map for Implementation, Fine-tuning and Submission of the project report .

COURSE OUTCOMES:

CO1: Demonstrate the critical theories of design, systems thinking, and design methodologies

CO2: Produce great designs, be a more effective engineer, and communicate with high emotional and intellectual impact

CO3: Understand the diverse methods employed in design thinking and establish a workable design thinking framework to use in their practices

CO4: Conceive, organize, lead and implement projects in interdisciplinary domain and address social concerns with innovative approaches.

CO5: Testing prototypes for digital products.

TEXT BOOKS:

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation 2012, HarperCollins Publishers Ltd.
2. Idris Mootee, Design Thinking for Strategic Innovation,2013, John Wiley & Sons Inc .

REFERENCE BOOKS:

1. Design Thinking and Innovation Metrics by Michael Lewrick **2023** — published.
2. Design Thinking for Business Growth by Michael Lewrick **2022**— published.
3. Design Thinking: Integrating Innovation, Customer Experience, and Brand Value by Thomas Lockwood — mentioned in a 2023 “must-read” list.
4. Design Thinking **2023**. (for SPPU BE AI & DS Engg Sem 7) — Indian edition / textbook, published .
5. Design Thinking 2022 (Nigel Cross) — updated edition .
6. Design Your Thinking: 2022 The Mindsets, Toolsets and Skill Sets for Creative Problem-Solving — recent toolkit style (year not exact but recent).

WEBSITE RESOURCES

1. **https://www.ideou.com/pages/design-thinking**
2. https://www.interaction-design.org/literature/topics/design-thinking
3. https://www.ibm.com/design/thinking/
4. https://www.nngroup.com/articles/design-thinking/
5. https://www.stanforddschool.org/resources/

MULTIDISCIPLINARY COURSES

24BMA001 **MATHEMATICS-I**

L	T	P	O	C
2	1	0	2	3

COURSE OBJECTIVES:

- To learn various concept in matrix
- To apply the concept of Sets to promote critical thinking, problem-solving technique and interdisciplinary connections.
- To analyse the relationships, decisions making and modeling complex systems using Partial Order Relations.

UNIT-I MATRICES& DETERMINANTS 9

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramer's Rule, Rank of Matrix Dependence of Vectors**. Determinants:** Definition, Minors, Cofactors, Properties of Determinants

UNIT-II: SETS 9

Sets: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

UNIT-III: RELATIONS & FUNCTIONS 9

Relations: Properties of Relations, Equivalence Relation. **Functions:** Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions,

UNIT-IV: PARTIAL ORDER RELATIONS 9

Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, GLB, LUB.

UNIT-V: NUMBER SYSTEM AND CONVERSIONS 9

Number Systems: Binary Numbers, Octal Numbers, Decimal numbers, Hexa Decimal numbers. **Number base conversions**: Octal and Hexa Decimal Numbers - Complements - Signed Binary Numbers - Binary Arithmetic - Binary Codes - Decimal Code

Total: 45 Hours

COURSE OUTCOMES:

CO1: Apply the concept of Matrix and solving simultaneous equations

CO2: Understand the ideas of Sets and its applications.

CO3: Identify the relations for various functions .

CO4: Apply the concept of partial order relation for various sets.

CO5: Understand the conversion of various number system.

TEXTBOOKS

1. Kolman, Busby, Ross and Rehman (2003), Discrete Mathematical Structures for Computer Science, Pearson Education, 5th Edition.

REFERENCE BOOKS

1. D.S. Malik and M.K. Sen(2004), Discrete Mathematical Structures: Theory and Applications, Thomson.
2. Goodaire & Parmenter (2000), Discrete Mathematics & Graph Theory, Pearson Education.
3. Kenneth H. Rosen, (2004), Discrete Mathematics and its Applications, Tata McGraw Hill, 5th Ed.
4. C.L. Liu (1986), Elements of Discrete Mathematics, 2nd Edition, McGraw Hill

Web Links:

1. https://www.geeksforgeeks.org/mathematics-partial-orders-lattices/
2. https://www.ipsgwalior.org/download/number%20system.pdf

24BMA002 **MATHEMATICS-II**

L	T	P	O	C
2	1	0	2	3

COURSE OBJECTIVES:

- To enable professional undergraduate students to understand the importance of Mathematics
- To provide basic knowledge of Discrete Mathematics and Probability.
- The main aim of this course is to help the students to read, classify and then interpret the data given to them and draw conclusions. Students understand the concepts like Logic, tautology and Probability.

UNIT 1: FUNDAMENTALS OF LOGIC 9

Fundamentals of logic: Introduction to logic, propositional logic, logical connectives and truth table, negation conjunction, disjunction.

UNIT 2: LOGIC AND TATUOLOGY 9

Conditional, bi-conditional or double implication, converse, inverse and contra positive, tautology and contradiction.

UNIT 3: PERMUTATIONS AND COMBINATIONS 9

Introduction -Fundamental Principle of Counting-Permutations: Problems on permutations – Combinations - Problems on combinations, Difference between permutations and combinations.

UNIT 4: BASICS OF PROBABILITY 9

Basics of probability: Basic Probability- Axioms of Probability- Addition and Multiplication theorem without proof-Conditional Probability-simple problems

UNIT 5: RANDOM VARIABLES 9

Random variable - Discrete random variables- Mean- Expectations- Variance- Independent random variables- simple problems, Continuous random variables- Mean- Expectations- Variance- simple problems.

Total : 45 Hours

COURSE OUTCOMES:

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

CO1: Apply the basic concepts of Mathematical reasoning.

CO2: Understand the types of logic

CO3: concept based on permutation and combinations.

CO4: Apply the concepts of Probability.

CO5: Understand the concepts of Random Variables.

Text books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, McGraw Hill.
2. R A Johnson And C.B.Gupta., Probability and statistics for engineers (Erwin Miller And John E.Freund), 7th edition, Pearson Education / PHI.

Reference Books:

1. R. P. Grimaldi (2007), "Discrete and Combinatorial Mathematics", Pearson Education, Fifth Edition
2. Thomas Koshy (2005), "Discrete Mathematics with Applications", Academic Press
3. S.I.Resnick (1999), A Probability Path, Birhauser, Berlin

Web links:

1. https://courses.umass.edu/phil110-gmh/text/c01.pdf
2. https://www.cuemath.com/data/permutations-and-combinations/
3. https://www.toppr.com/guides/maths/probability/introduction-to-probability/

24BMA003 **STATISTICS**

L	T	P	O	C
2	1	0	2	3

COURSE OBJECTIVE:

- To learn statistical concepts including measures of central tendency.
- To apply the concept of dispersion to promote critical thinking, problem-solving techniques and interdisciplinary connections.
- To analyze the correlation and regression analysis, sampling, hypothesis testing..

UNIT I DIAGRAMMATIC AND GRAPHICAL REPRESENTATION OF DATA (9 hrs)

Introduction – Scope and Limitations of Statistical methods- Collection of data-Classification of data-Tabulation- Diagrammatic representation of data- Simple bar diagram, Multiple bar diagram, Percentage bar diagram and Pie diagram- Graphical representation of data- Histogram, Frequency polygon and Frequency curves.

UNIT II MEASURES OF CENTRAL TENDENCY (9 hrs)

Introduction- Types of Averages-Mean, Median, Mode- Empirical Relation- Geometric mean and Harmonic Mean-Merits and Demerits.

UNIT III MEASURES OF DISPERSION (9 hrs)

Introduction -Measures of Dispersion- Range, Quartile Deviation, Coefficient of Range and Coefficient of Quartile Deviation - Mean Deviation, Standard Deviation and Coefficient of variation.

UNIT IV CORRELATION AND REGRESSION ANALYSIS (9 hrs)

Introduction - Definition of Correlation - Types of Correlation-Methods of Correlation- Karl Pearson's Correlation Coefficient – Spearman's Rank Correlation Coefficient– Regression Coefficients- Regression Lines and Regression equations.

UNIT V TESTING OF HYPOTHESIS (9 hrs)

Introduction- Testing of Hypothesis, Single mean test - students t-distribution. F- test, Chi-square test.

Total 45 Hours

COURSE OUTCOMES

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

CO1 Understand the key terminology, concepts tools and techniques used in Statistical Analysis and techniques used diagrammatic methods. K4

CO2 Evaluate the underlying assumptions of analysis tools of measures of central tendency. K4

CO3 Apply assumptions of analysis tools of measures of dispersion. K3

CO4 To Create and interpret a line of best fit. Calculate and interpret the correlation coefficient. K3

CO5 Analyze the uses and limitations of Testing of hypothesis K6

TEXT BOOKS:

1. S.P. Gupta, Statistical Methods, 44thEdition, Sultan Chand & Sons,2014.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & Sons,
2. 3rdEdition, 2023.
3. Beri G, Business Statistics, Tata McGraw Hill Publishing Company Limited, 2009.

REFERENCE BOOKS:

1. P.R. Vittal and V. Malini, Statistical and Numerical Methods, Margham Publications,1st
2. Edition,2007.
3. S.P. Rajagopalan and R. Sattanathan, Business Statistics and Operations Research,
4. Vijay Nicole Pvt. Ltd, 2018.

WEB SOURCES

1. https://d3bxy9euw4e147.cloudfront.net/oscms-
2. prodcms/media/documents/IntroductoryBusinessStatistics-OP.pdf
3. http://www.ddegjust.ac.in/studymaterial/mcom/mc-106.pdf

MULTIDISCIPLINARY ELECTIVE

24EMDE31 INDIAN KNOWLEDGE SYSTEM

L	T	P	O	C
2	0	0	0	2

COURSE OBJECTIVES

- To Gain an understanding of Indian Knowledge System.
- To Develop an ability to apply the Indian Knowledge System to societal challenges faced today in areas such asholistic health, governance, public administration and sustainable living.
- To Promote the youths to do research in the various fields of Indian knowledge system.

UNIT1: AN OVERVIEW OF INDIAN KNOWLEDGE SYSTEM **6**

Introduction- Organization of Indian Knowledge System- The IKS corpus- A Classification framework- Historicity of Indian Knowledge System -Some salient aspects of Indian Knowledge System

UNIT 2: PHILOSOPHICAL SYSTEM **6**

Introduction to Philosophy- Development of Indian Philosophical system - Unique features of Indian Philosophical system- Introduction to Yoga.

UNIT 3 : GOVERNANCE AND PUBLIC ADMINISTRATION **6**

Introduction - Understanding Governance from ancient to modern times- Relevance of Arthashastra- Glimpses of Nitishastra- Vidura Niti.

UNIT 4 : WISDOM THROUGH THE AGES **6**

Gateways of ancestral wisdoms-Introduction to Purāṇa- The Purāṇic repository- Issues of interest in Purāṇas- Introduction to Itihāsas- Key messages in Itihāsa-Wisdom through Nīti-śāstra.

UNIT 5 MATHEMATICS **6**

Introduction to Indian Mathematics- Unique aspects of Indian Mathematics- Indian Mathematicians and their Contributions.

Total 30 hours

COURSE OUTCOMES:

CO1 : Classify the key concepts of Indian Knowledge System and discuss the multi-faceted nature of knowledge contained in the Traditional Systems of India.

CO2 : Identify the rich heritage of governance in Indian Knowledge System.

CO3 : Recognize the relevance of Arthash astra in public administration.

CO4 :Identify the Wisdom through Ages through Ithihasas.

CO5 : Knowledge of Indian Mathematicians and their contributions.

TEXT BOOKS:

1. Mahadevan B., Bhat V R, Nagendra Pavana R.N., Indian Knowledge System Concepts andApplication, PHI Learning Pvt. Ltd., 2022.
2. Kapoor Kapil, and Singh Avadesh Kumar, Indian Knowledge System Vol.1, DK Print World,Ltd., 2005.

REFERENCE BOOKS

1. Textbook on The Knowledge System of Bhārata by Bhag Chand Chauhan.
2. Histrory of Science in India Volume-1, Part-I, Part-II, Volume VIII, by Sibaji Raha, et al. National Academy of Sciences, India and The Ramkrishan Mission Institute of Culture, Kolkata

WEBLINK:

1. https://onlinecourses.swayam2.ac.in/imb23_mg54/preview
2. https://digest.iimb.ac.in/2022/04/book-indian-knowledge-systems-co-authored-dr-b-mahadevan/
3. https://www.summarize.tech/www.youtube.com/watch?v=jcV0LIp570A

VALUE ADDED COURSES

24DVAC11 **UNIVERSAL HUMAN VALUES**

L	T	P	O	C
1	0	0	1	1

COURSE OBJECTIVES:

The candidates will be able to appreciate the complementarity between the values and skills for sustained happiness and prosperity. To influence the students to approach the life and profession with a holistic perspective towards a value-based living in a natural way. To highlight plausible implications of holistic understanding of ethical human conduct.

UNIT- I INTRODUCTION TO VALUE EDUCATION 5

Living a fulfilling life. Value education. Skill education. Complementarity of Values and Skills. Development of a holistic perspective. Right understanding, relationship and physical facility. Understanding the happiness and prosperity.

UNIT-II HARMONY AT MULTIPLE LEVELS 5

Human being as co-existence of the self and the human body. Understanding harmony in the self. Harmony in the family and understanding values in human-human relationships. Harmony in the society and understanding universal human order. Harmony in nature and understanding the interconnectedness, self-regulation and mutual fulfillment. Harmony in existencedot and understanding co-existence at various levels.

UNIT-III IMPLICATIONS OF THE RIGHT UNDERSTANDING 5

Ethical human conduct. Implications of value-based living. Right understanding of professional ethics. Humanistic education. Holistic technologies, production systems and management models. Strategies for transition towards value-based life and profession.

Total: 15 Hours

COURSE OUTCOMES:

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

CO1: Develop qualities like responsibility and the ability to handle problems with sustainable solutions.

CO2: Appraise human values and the harmony at various levels.

CO3: Perceive a better critical ability.

CO4: Develop qualities pertaining to value-based living.

CO5: Apply what they have learnt to their own self in real life settings.

TEXT BOOKS:

1. R.R. Gaur, R. Asthana, G.P. Bagaria. (2023). A Foundation Course in Human Values and Professional Ethics. 3rd Revised Edition. Excel Books, New Delhi.

REFERENCE BOOKS:

1. Nagaraj, Jeevan Vidya Prakashan, Amar Kantak. Jeevan Vidya (1999), Ek Parichaya
2. Rakesh Gupta. Jeevan Vidya (2008), An Introduction (Introductory Book to Madhyasth Darshan-Coexistentialism). English Version.
3. N. Tripathi (2004), Human Values. First Edition. New Age International Publishers, New Delhi.

24DVAC21 **COMMUNICATION SKILLS**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

CO1: To develop effective verbal and non-verbal communication techniques for various contexts.

CO2: To enhance listening skills for better comprehension and engagement in conversations.

CO3: To improve written communication abilities, focusing on clarity, coherence, and style.

CO4: To build confidence in public speaking through practice and constructive feedback.

CO5: To cultivate interpersonal skills for successful collaboration and professional interactions.

Unit I –Introduction to Communication Skills **6**

- Fundamentals of Communications
- Elements of Communication, Types of Communication

Unit II - Practical English **6**

- Importance of the language - Word Usage and Jargon
- Tenses and the effectiveness - Basics of grammar (Noun/Verb/Adverb/Conjunction)

Unit III - Effective Communication **6**

- LSRW (Listening, Speaking, Reading & Writing)
- Pronunciation - Vocabulary Building
- Intonations & its importance

Unit IV - Workplace Communication **6**

- Basics of telephone etiquette
- E-Mail writing
- Presentation Skills
- Interpersonal Skills
- Business English

Unit V - Quantitative Ability **6**

- Verbal Ability - Verbal Analogy
- Debating Skills - Public Speaking

Total : 30 Hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

CO1 Enhance participants' business communication skills

CO2 Enhance LSRW Skills (LSRW – Listening, Speaking, Reading & Writing)

CO3 Express opinions at free will in social/ personal gathering

CO4 Impact leadership qualities among participants

CO5 Engage in conversation with others to exchange ideas

TEXT BOOKS:

1. Andreja. J. Ruther Ford (2011),Basic communication skills for Technology, 2nd Edition, Pearson Education.
2. Barun K Mitra (2011), Personality development and soft skills, 1 st Edition, Oxford Press.
3. Elizabeth Harren, 7 April (2022), last updated: 16 November, (2023)
4. Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzler (McGraw-Hill)

REFERENCE BOOKS:

1. Ethan Beute and Stephen Pacinelli (Greenleaf)
2. Francis Peters SJ (2011), Soft skills and professional communication, 1stEdition, McGraw Hill Education.

24DVAC41 **YOGA EDUCATION**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

The students will be able to:

- Understand the philosophy, aims, and health benefits of Yoga.
- Gain practical knowledge of yogic postures, breathing techniques, and relaxation practices.
- Apply yogic methods for stress reduction, emotional balance, and focus enhancement.
- Incorporate Yoga as a tool for lifestyle improvement, well-being, and inner awareness.

UNIT-I INTRODUCTION TO YOGA 5

Definition and meaning of Yoga – Classical and modern perspectives. -Philosophy and objectives of Yoga-Benefits of Yoga for physical, mental, and emotional health -Relevance of Yoga in daily life, especially for students and professionals - Guidelines for safe and mindful Yoga practice

UNIT II YOGA PRACTICES – ASANAS AND BREATHING 5

Loosening and warm-up exercises Neck, shoulder, spine, and joint movements - Standing AsanasTadasana, Trikonasana, Vrikshasana - Sitting AsanasVajrasana, Ardha Matsyendrasana, Bhadrasana - Prone and Supine AsanasBhujangasana, Shalabhasana, Pavanamuktasana - Breathing Practices (Pranayama)Anulom Vilom, Bhramari, Sheetali, Sheetkari - Relaxation TechniquesDeep Relaxation Technique (DRT)

UNIT-III YOGA FOR MENTAL WELL-BEING & LIFESTYLE MANAGEMENT 5

Ecosystems and ecosystem services: Major ecosystem types in India and their basic Role of Yoga in managing stress, anxiety, and fatigue - Importance of meditation and breath regulation - Basics of meditation: breath-based and mindfulness - Yogic lifestyle guidelines – diet, discipline, sleep, and conduct - Integrating Yoga into student routine for balance and productivity

Total: 15 hours

TEXT BOOKS & REFERENCE BOOKS:

1. Ministry of AYUSH. (2023). Common Yoga Protocol. Government of India
2. Swami Satyananda Saraswati. Asana, Pranayama, Mudra, Bandha. Bihar School of Yoga
3. Dr. R. Nagarathna & Dr. H. R. Nagendra. Yoga for Students. SVYASA
2. NCERT. (2020). Yoga – A Healthy Way of Living (Upper Primary and Secondary)

COURSE OUTCOMES (CO):

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

CO1: Explain the meaning and relevance of Yoga for overall well-being.

CO2: Demonstrate basic asanas and breathing techniques with proper alignment.

CO3: Practice guided relaxation and introductory meditation.

24SNSS41 **NATIONAL SERVICE SCHEME**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

The students will be able to understand the concept of youth and the importance of youth population in Nation Building. The course also enable the students to appraise the nature and growth of national service scheme in India. The course enable the students to perceive the aims, objectives, logo, emblem and organizational structure of NSS.

UNIT-I INTRODUCTION 5

Introduction to National Service Scheme. Philosophy of NSS. Basic concepts of NSS-Motto, Symbol, Badge, NSS Day. NSS programs and activities; NSS Components-Programme Officer, Volunteer, Community. Classification of NSS Programme.

UNIT-II ACTIVITIES OF NSS 5

Regular activities of NSS – Adoption of villages, slums etc., Coordination with Voluntary Organizations, National Service Volunteer Scheme (NSVS), Day Camps, Special Camping Program-objectives, contributions and activities.

UNIT-III ADMINISTRATION, PLANNING & IMPLEMENTATION OF NSS PROGRAMS 5

Administrative structure of NSS at National, State and University levels. NSS advisory committees. Planning and Implementation of NSS Programs-Off campus activities- Rally, Swatchatha Programme, Visit to heritage sites, conserving ancient monuments, Women empowerment program, Blood donation, Water conservation program etc.

Total : 15 Hours

COURSE OUTCOMES:

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

CO1: To explain the philosophy and basic concepts of NSS.

CO2: To appraise the activities of NSS.

CO3: To discuss the concepts of Special Camping Program.

TEXT BOOKS:

1. National Service Scheme Manual (Revised), (2006), Government of India, Ministry of Youth Affairs and Sports, New Delhi.
2. Afsal Mohammad B, (2020), An introduction to volunteerism in India.

24DVAC51 **VALUE EDUCATION**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

The course aims to nurture ethical principles, holistic living, and moral values, fostering responsible and balanced individuals. It equips students with essential life skills like decision-making, teamwork, and time management while promoting awareness of human rights and environmental conservation. Additionally, it sensitizes learners to social issues and prepares them to address societal challenges effectively.

Unit I **6**

Value education-its purpose and significance in the present world – Value system – The role of culture and civilization-Holistic living – Balancing the outer and inner – Body, Mind and Intellectual level- Duties and responsibilities.

Unit II **6**

Salient values for life- Truth, commitment, honesty and integrity, forgiveness and love, empathy and ability to sacrifice, care, unity , and inclusiveness, Self esteem and self confidence, punctuality – Time, task and resource management -Problem solving and decision making skills- Interpersonal and Intra personal relationship – Team work – Positive and creative thinking

Unit III **6**

Human Rights – Universal Declaration of Human Rights – Human Rights violations – National Integration – Peace and non-violence – Dr. A P J Kalam's ten points for englightened citizenship – Social Values and Welfare of the citizen – The role of media in value building.

Unit IV **6**

Environment and Ecological balance – interdependence of all beings – living and non-living. The binding of man and nature – Environment conservation and enrichment.

Unit V **6**

Social Evils – Corruption, Cyber crime, Terrorism – Alcoholism, Drug addiction – Dowry – Domestic violence – untouchability – female infanticide – atrocities against women- How to tackle them

Total: 30 Hours

COURSE OUTCOMES

CO1: Understand the significance of value systems, holistic living, and individual responsibilities to achieve personal and societal balance.

CO2: Develop core values such as integrity, empathy, and time management skills, along with problem-solving and effective decision-making abilities.

CO3: Gain awareness of human rights, social welfare, and the role of media in fostering peace, unity, and enlightened citizenship.

CO4: Comprehend the importance of environmental conservation, ecological balance, and the interconnectedness of all living and non-living beings.

CO5: Identify and analyze social evils like corruption, cybercrime, and domestic violence, and explore strategies to combat these issues.

TEXT BOOKS:

1. Roger Packham, Margaret Taplin, Kevin Francis - How Values Education Can Improve Student and Teacher Wellbeing - 2024
2. Various Authors - Value-Creating Education: Teachers' Perceptions and Practice - 2021

REFERENCE BOOKS:

1. Nucci, Larry, and Ilten-Gee, Robyn. Moral Education for Social Justice. 2021
2. John Chi-Kin Lee, *Spiritual, Life and Values Education for Children*, 2023

SKILL ENHANCEMENT COURSES

24SSKU11 **SOFT SKILLS-I**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

CO1: To learn and apply basic etiquette for personal and professional interactions.

CO2: To develop effective stress management techniques for maintaining mental and emotional well-being.

CO3: To enhance self-awareness for personal growth and informed decision-making.

CO4: To gain an overview of essential 21st-century skills necessary for success in a rapidly changing world.

CO5: To foster creativity and critical thinking skills for innovative problem-solving and adaptability.

UNIT I INTRODUCTION TO SOFT SKILLS 6

- Soft Skills vs Hard Skills
- 15 important Soft Skills
- Communication Skills, Time Management, Leadership Skills

UNIT II - OVERVIEW OF 21ST CENTURY SKILLS. 6

- Lateral Thinking – Left Brain/Right Brain Functionality
- Problem solving skills

UNIT III - SELF AWARENESS 6

- Human Values
- Mindfulness
- SWOT Analysis
- PDCA Approach

UNIT IV - CREATIVITY/CRITICAL THINKING 6

- Six Thinking Traits
- Creative writing exercises
- Open mindedness

UNIT V - PERSONAL HYGIENE AND STRESS MANAGEMENT 6

- Basic Etiquettes
- Health and Personal Grooming
- Stress-meaning and nature, Eustress, Distress
- Stress management strategies

Total: 30 Hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

CO1: Demonstrate basic etiquette in various personal and professional settings.

CO2: Effectively manage stress using learned techniques.

CO3: Show increased self-awareness and make informed decisions.

CO4: Understand and articulate key 21st-century skills.

CO5: Apply creativity and critical thinking to solve problems innovatively.

REFERENCES:

1. Alex, Dr. K. (2014), Soft Skills (1st edition) S Chand & Company
2. Taylor,(2005), Grant English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd
3. Tiko, Champa& Jaya Sasikumar (1979), Writing with a purpose. OUP New Delhi
4. Nelson-Jones, R. (1992), Life skills, a handbook, Trowbridge, Wilts: Detesios Ltd.
5. Tuhovsky, Ian (2019), Communication Skills Training (2nd edition) Rupa Publication India.

24SSKU21 **SOFT SKILLS-II**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

CO1: To develop strategies to enhance teamwork and collaboration in professional settings.

CO2: To cultivate a positive attitude and mindset to foster constructive relationships and productivity.

CO3: To develop leadership, decision-making and team bonding skills

UNIT I - PROFESSIONAL BEHAVIOUR 6

- Team Building – Team Bonding
- Inter-Personal Relationship– Intra-Personal Relationship

UNIT II - PERSONALITY DEVELOPMENT 6

- Types of Personality
- Self-Confidence - Confidence Building
- Attitude (Positive/Negative)

UNIT III - TELEPHONE ETIQUETTE 6

- Basics of telephone etiquette
- Giving clear and concise information
- Tone & rate of speech
- Intonations & its Importance
- WhatsApp Communications

UNIT IV - DECISION MAKING 6

- Types of Decisions – planned-unplanned, individual-group, major-minor
- Types of Leadership styles – Autocratic, democratic, lesse-faire, participative, bureaucratic.

UNIT V- PROFESSIONAL ETIQUETTE 6

- Respect – Salutations
- Official Behaviour

Total :30 Hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

CO1: Understand the principles of effective team building and apply strategies to foster team bonding and cohesion in professional settings.

CO2: Become self-confident individuals by mastering interpersonal skills, team management skills, and leadership skills.

CO3: Practice techniques for effective communication in telephone conversations.

CO4: Evaluate decision-making processes and their implications in professional settings.

CO5: Exhibit professional conduct and demeanor in various professional situations.

REFERENCE BOOKS:

1. Language Service, Universitat Oberta de Catalunya
2. Taylor (2005, Grant English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd.
3. Tiko, Champa& Jaya Sasikumar(1979), Writing with a purpose. OUP New Delhi
4. Alex, Dr. K. (2014), Soft Skills (1st edition) S Chand & Company.
5. Nelson-Jones, R. (1992), Life skills, a handbook, Trowbridge, Wilts: Detesios Ltd.

24SSKU31 **SOFT SKILLS-III**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES

- To hone the creative and critical faculties of learners.
- To enhance descriptive and narrative skills through short story creation.
- To acquire professional reports and review writing skills for various mediums.
- To gain practical writing skills for television, radio, magazines, and the web, emphasizing freelance opportunities.

UNIT 1 Introduction **12**

- Meaning and Significance of Creative Writing Refining Vocabulary, Word order, Developing Hints

Unit II Writing Skills **12**

- Genres of Writing
- Descriptive Passages, Short Stories, Narration of incidents

Unit III Academic Writing **12**

- Report Writing, Writing of book reviews and film reviews

Unit IV Writing for Media **12**

- Writing for TV, Radio and Magazine, Freelance Writing, Preparation of Web Content.

Unit V Advertisement Writing **12**

- Types of advertising and advertising media, Writing techniques
- Ineffective advertisement, Code of ethics for advertisement Advertising and marketing.

Total 30 hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

CO1 : Craft rhymes, free verse, jokes, and articles proficiently

CO2 :Create descriptive passages and short stories to exhibit their creative writing prowess.

CO3 : Write informative reviews and structured reports for diverse media.

CO4 : Create compelling content for various platforms, adhering to ethical standards in Advertising and marketing principles.

TEXT/REFERENCE BOOKS:

1. Creative Writing Log by Swan, published by Emerald in 2009.
2. Creative Writing by Isabelle Krishnan, published by Fairfield in 2013.
3. The Practice of Writing by David Lodge, published by Vintage in 2011.

24SBCY41 INDUSTRY ORIENTED EMPLOYABILITY SKILLS

(CAREER SKILLS)

L	T	P	O	C
1	0	2	1	2

COURSE OBJECTIVES

- To develop practical job search strategies, including resume writing and interviewing skills.
- To enhance communication and presentation skills for professional environments.
- To cultivate teamwork and collaboration abilities through group projects and activities.
- To build problem-solving and critical thinking skills applicable to real-world industry scenarios.
- To understand and adapt to workplace ethics, culture, and professional behaviour.

Unit I - Employee/Employer Expectations **6**

- Loyalty, Growth Chart
- Hierarchy – Escalation Matrix

Unit II - Current Affairs & GK **6**

- Technology, Sports
- National Politics
- International Affairs

Unit III - Job Preparedness **6**

- Bio-data, Resume, CV
- Social Media –Professional Presence (LinkedIn, FB, Instagram, Twitter)
- Cover Letter.

Unit IV - Interview Skills **6**

- Types of Interviews
- Dress Code & Attire
- Group Discussion
- Self Selling

Unit V - Practical & Project **6**

- Mock GD – Mock Interview
- Individual project presentation – viva voce

Total 30 hours

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

CO1: Effectively create resumes and perform well in job interviews.

CO2: Demonstrate strong communication and presentation skills in professional settings.

CO3 : Efficiently in teams and collaborate on projects.

CO4 : Apply problem-solving and critical thinking skills to industry-related challenges.

CO5 : Understand and exhibit appropriate workplace ethics and professional behaviour.

TEXT/REFERENCE BOOKS:

1. "Cracking the Coding Interview: 189 Programming Questions and Solutions" by Gayle McDowell
2. "What to Say in Every Job Interview: Word-for-Word Scripts for Acing the Interview" by Don Georgevich
2. "The Art of Interviewing: How to Ace Your Next Job Interview" by Peter Roberts

24SBCY51 **ENTREPRENEURIAL DEVELOPMENT**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

To enrich the students towards the knowledge of entrepreneurial skills and to make the students understand the approaches to attain the goals of the business.

UNIT 1: INTRODUCTION TO ENTREPRENEURSHIP 6

Introduction, Concept of Entrepreneur, Entrepreneurship and Enterprise, Definition of Entrepreneurship, Objectives of Entrepreneurship Development, Phases of Entrepreneurship Development, Role of Entrepreneurship, The Entrepreneurial Mindset, Characteristics of Entrepreneurship, Traits of Entrepreneurship, Introduction to Entrepreneurship Skills

UNIT 2: ENTREPRENEURSHIP DEVELOPMENT SKILLS 6

Meaning of Entrepreneurship skill, Types of Entrepreneurship Skills: Business management skills, Teamwork and leadership skills, Communication and listening, Customer service skills, Financial skills, Analytical and problem-solving skills, Critical thinking skills, Strategic thinking and planning skills, Technical skills, Time management and organizational skills, Branding, marketing and networking skills, How to improve entrepreneurial skills, Entrepreneurial skills in the workplace.

UNIT 3: TYPES OF ENTREPRENEURS 6

Classification and Types of Entrepreneurs; Women Entrepreneurs; Social Entrepreneurship; Corporate Entrepreneurs, Family Business: Concept, structure, and kinds of family firms; Culture and evolution of family firm; Managing Business.

UNIT 4: ENTREPRENEUR PROJECT DEVELOPMENT & BUSINESS PLAN 6

Generation of Ideas-Innovation, Invention, Creativity, Business Idea and change. Idea generation. Kinds of Business Analysis-Concept of Environmental scanning and SWOT analysis. Business Planning Process-The business plan as an Entrepreneurial tool, scope and value of Business plan. Fundamental Elements of Business-Plan, Objectives, Market and Feasibility Analysis, Marketing, Finance, Organisation & Management and Ownership.

UNIT 5: MOBILIZING RESOURCES 6

Resource Mobilization for entrepreneurship: Resources mobilization, types of resources, Process of resource mobilization, Arrangement of funds; writing a Funding Proposal, Traditional sources of financing, Venture capital, Angel investors, Business Incubators

Total: 30 Hours

COURSE OUTCOMES:

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

CO1 To Understand the concept of Entrepreneurship

CO2 To Identify, create and analyze entrepreneurial opportunities.

CO3 To Assess techno economic feasibility of a Business Plan

CO4 To Create Business Plans

CO5 To State various statutory institutions involved in the process of Entrepreneurship development

TEXT BOOKS:

1. Madhurima Lall and Sultan Ahmad (2021). Fundamentals of Entrepreneurship and Project Planning. S. Chand & Sons.
2. Bhatia. RC (2020). Entrepreneurship: Business and Management. S. Chand & Sons.
3. Nitin Zaware, Shilpa R Kankonkar and Yogesh S. Daudkhane (2019), Entrepreneurship
4. Development. Thakur Publications Pvt. Ltd.

WEB REFERENCES:

1. https://openpress.usask.ca/entrepreneurshipandinnovationtoolkit/chapter/chapter-1-introduction- to-entrepreneurship/
2. https://articles.bplans.com/10-great-websites-for-entrepreneurs/
3. https://www.entrepreneur.com/article/272185

24SBCY61 **MINI PROJECT**

L	T	P	O	C
2	0	0	2	2

COURSE OBJECTIVES:

The objective of the mini project is to help the student develop the ability to apply theoretical

and practical tools / techniques to solve real life problems related to industry academic institutions.

Students are to take up sample project development activities with the guidelines given below:

1. Preparing a project - brief proposal including:
   - Problem Identification
   - Developing a model for solving the problem
   - A statement of system / process specifications proposed to be developed (Data
   - FlowDiagram)
   - List of possible solutions including alternatives and constraints
   - Cost benefit analysis
   - Time line activities
2. A report highlighting the design finalization [based on functional requirements & standards(if any)]
3. A presentation including the following:
   - Implementation phase (Hardware / Software / both)
   - Testing & Validation of the developed system
   - Learning in the Project Consolidated report preparation.

Total: 30 Hours

COURSE OUTCOMES:

At the End of this Course, the Student will be able to:

CO-1: Create new project with Report:

CO-2: Evaluate project scope and Objectives.

CO-3: Analyze Software, Hardware and tools needed for the Project.

CO-4: Apply technical knowledge to solve project problem.

CO-5: Understand the implementation of Project

SUMMER INTERNSHIP

24IBCY31 **INTERNSHIP-I**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

The internship aims to:

1. Provide hands-on experience with software development, programming, and problem-solving.
2. Expose participants to real-world IT workflows, software life cycles, and project management.
3. Enhance understanding of core computer science domains such as data structures, algorithms, and system design.
4. Develop skills in emerging technologies like cloud computing, machine learning, and cybersecurity.
5. Build teamwork, communication, and technical documentation abilities.

COURSE MODULES

Module 1: Introduction to Software Development

- Overview of SDLC
- Tools for Software Development (e.g., Git, JIRA, IDEs)
- Agile and Scrum Methodologies

Module 2: Programming Fundamentals and Development

- Review of Core Programming Languages (C++, Java, Python, etc.)
- Hands-on: Developing Algorithms and Solving Problems
- Working with APIs and Libraries

Module 3: Web and Mobile Application Development

- Basics of Web Technologies (HTML, CSS, JavaScript)
- Backend Development (Node.js, Django, or Flask)
- Mobile App Development (Flutter or React Native)
- Hands-on: Developing a Full-Stack Application

Module 4: Data Structures and Algorithms

- Problem Solving with Data Structures (Arrays, Trees, Graphs, etc.)

- Algorithmic Techniques (Sorting, Searching, Dynamic Programming)
- Competitive Programming Exercises

Module 5: Database Design and Management

- Relational Databases (SQL) and NoSQL Databases (MongoDB)
- Database Modeling and Normalization
- Hands-on: Building and Querying Databases

Module 6: Emerging Technologies

- Basics of Cloud Computing (Azure, AWS, or Google Cloud)
- Introduction to Machine Learning and AI
- Cybersecurity Essentials
- Hands-on: Implementing Cloud or ML Features in a Project

Module 7: Final Project

- Selection of a Domain-Specific Problem (E.g., E-Commerce, IoT Integration)
- Team Collaboration and Milestone Planning
- Project Development, Testing, and Deployment
- Final Presentation and Documentation

Total: 15 Hours

COURSE OUTCOMES:

Upon completion of this internship, participants will be able to:

CO1: Apply computer science concepts to real-world problems effectively.

CO2: Develop, test, and deploy software applications.

CO3: Demonstrate proficiency in programming languages and frameworks used in the internship.

CO4: Understand and contribute to software development lifecycle (SDLC) processes.

CO5: Work collaboratively on team projects, using agile or other methodologies.

CO6: Present technical findings and document project outcomes effectively.

24IBCY51 **INTERNSHIP-II**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

The internship aims to:

1. Provide hands-on experience with software development, programming, and problem-solving.
2. Expose participants to real-world IT workflows, software life cycles, and project management.
3. Enhance understanding of core computer science domains such as data structures, algorithms, and system design.
4. Develop skills in emerging technologies like cloud computing, machine learning, and cybersecurity.
5. Build teamwork, communication, and technical documentation abilities.

COURSE MODULES

Module 1: Introduction to Software Development

- Overview of SDLC
- Tools for Software Development (e.g., Git, JIRA, IDEs)
- Agile and Scrum Methodologies

Module 2: Programming Fundamentals and Development

- Review of Core Programming Languages (C++, Java, Python, etc.)
- Hands-on: Developing Algorithms and Solving Problems
- Working with APIs and Libraries

Module 3: Web and Mobile Application Development

- Basics of Web Technologies (HTML, CSS, JavaScript)
- Backend Development (Node.js, Django, or Flask)
- Mobile App Development (Flutter or React Native)
- Hands-on: Developing a Full-Stack Application

Module 4: Data Structures and Algorithms

- Problem Solving with Data Structures (Arrays, Trees, Graphs, etc.)
- Algorithmic Techniques (Sorting, Searching, Dynamic Programming)

- Competitive Programming Exercises

Module 5: Database Design and Management

- Relational Databases (SQL) and NoSQL Databases (MongoDB)
- Database Modeling and Normalization
- Hands-on: Building and Querying Databases

Module 6: Emerging Technologies

- Basics of Cloud Computing (Azure, AWS, or Google Cloud)
- Introduction to Machine Learning and AI
- Cybersecurity Essentials
- Hands-on: Implementing Cloud or ML Features in a Project

Module 7: Final Project

- Selection of a Domain-Specific Problem (E.g., E-Commerce, IoT Integration)
- Team Collaboration and Milestone Planning
- Project Development, Testing, and Deployment
- Final Presentation and Documentation

Total: 15 Hours

COURSE OUTCOMES:

Upon completion of this internship, participants will be able to:

CO1:Apply computer science concepts to real-world problems effectively.

CO2: Develop, test, and deploy software applications.

CO3: Demonstrate proficiency in programming languages and frameworks used in the internship.

CO4: Understand and contribute to software development lifecycle (SDLC) processes.

CO5: Work collaboratively on team projects, using agile or other methodologies.

CO6: Present technical findings and document project outcomes effectively.

RESEARCH PROJECT

24RBCY71 **RESEARCH PROJECT-I**

L	T	P	O	C
0	0	12	4	6

COURSE OBJECTIVES:

The research projects program aims to:

1. Equip students with the ability to conduct independent and team-based research.
2. Develop skills in identifying, formulating, and solving complex research problems.
3. Enhance proficiency in research methodologies, tools, and techniques.
4. Foster critical thinking, innovation, and analytical reasoning.
5. Prepare students to publish and present their findings in academic or industrial forums.

COURSE MODULES

Module 1: Introduction to Research

- Understanding Research in Computer Science
- Types of Research: Exploratory, Descriptive, and Experimental
- Importance of Problem Identification and Research Questions

Module 2: Literature Review and Gap Analysis

- Techniques for Conducting a Literature Review
- Tools for Reference Management (e.g., Zotero, Mendeley)
- Identifying Gaps and Formulating Objectives

Module 3: Research Methodology

- Qualitative vs. Quantitative Research
- Data Collection Techniques (Surveys, Experiments, Simulations)
- Research Tools and Platforms (MATLAB, R, Python)

Module 4: Proposal Development

- Writing a Research Proposal
- Setting Goals, Deliverables, and Milestones
- Ethical Guidelines and Considerations

Module 5: Implementation and Experimentation

- Designing and Conducting Experiments
- Data Analysis and Interpretation
- Tools for Data Visualization (Tableau, matplotlib, Power BI)

Module 6: Documentation and Reporting

- Structuring Research Papers (Abstract, Introduction, Methods, Results, Conclusion)
- Writing Technical Reports and Presentations
- Formatting and Publishing in Journals/Conferences

Module 7: Final Project Presentation

- Developing Final Deliverables (Prototype, Model, or Software)
- Presentation to Peers and Evaluators
- Peer Reviews and Feedback Integration

Total: 180 Hours

COURSE OUTCOMES:

Upon completing the research project course, students will be able to:

1. Identify and define research problems within a domain of interest.
2. Conduct thorough literature reviews and gap analyses.
3. Apply appropriate research methodologies and tools to explore solutions.
4. Develop and test hypotheses or prototypes based on research objectives.
5. Analyze and interpret research data effectively.
6. Present findings through well-structured reports, presentations, or publications.
7. Understand ethical considerations in research and intellectual property rights.
8. Collaborate effectively with peers and mentors to achieve research objectives.

24RBCY81 **RESEARCH PROJECT-II**

L	T	P	O	C
0	0	12	4	6

COURSE OBJECTIVES

The research projects program aims to:

1. Equip students with the ability to conduct independent and team-based research.
2. Develop skills in identifying, formulating, and solving complex research problems.
3. Enhance proficiency in research methodologies, tools, and techniques.
4. Foster critical thinking, innovation, and analytical reasoning.
5. Prepare students to publish and present their findings in academic or industrial forums.

COURSE MODULES

Module 1: Introduction to Research

- Understanding Research in Computer Science
- Types of Research: Exploratory, Descriptive, and Experimental
- Importance of Problem Identification and Research Questions

Module 2: Literature Review and Gap Analysis

- Techniques for Conducting a Literature Review
- Tools for Reference Management (e.g., Zotero, Mendeley)
- Identifying Gaps and Formulating Objectives

Module 3: Research Methodology

- Qualitative vs. Quantitative Research
- Data Collection Techniques (Surveys, Experiments, Simulations)
- Research Tools and Platforms (MATLAB, R, Python)

Module 4: Proposal Development

- Writing a Research Proposal
- Setting Goals, Deliverables, and Milestones
- Ethical Guidelines and Considerations

Module 5: Implementation and Experimentation

- Designing and Conducting Experiments
- Data Analysis and Interpretation
- Tools for Data Visualization (Tableau, matplotlib, Power BI)

Module 6: Documentation and Reporting

- Structuring Research Papers (Abstract, Introduction, Methods, Results, Conclusion)
- Writing Technical Reports and Presentations
- Formatting and Publishing in Journals/Conferences

Module 7: Final Project Presentation

- Developing Final Deliverables (Prototype, Model, or Software)
- Presentation to Peers and Evaluators
- Peer Reviews and Feedback Integration

Total: 180 Hours

COURSE OUTCOMES

Upon completing the research project course, students will be able to:

1. Identify and define research problems within a domain of interest.
2. Conduct thorough literature reviews and gap analyses.
3. Apply appropriate research methodologies and tools to explore solutions.
4. Develop and test hypotheses or prototypes based on research objectives.
5. Analyze and interpret research data effectively.
6. Present findings through well-structured reports, presentations, or publications.
7. Understand ethical considerations in research and intellectual property rights.
8. Collaborate effectively with peers and mentors to achieve research objectives.