

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

BCA Three Years

/

BCA (Hons)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 Computer Applications (UG)

School of Computing Sciences

VELS

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
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DEPARTMENT OF COMPUTER APPLICATIONS (UG)

VISION OF THE DEPARTMENT
To produce globally competent graduates, skilled intellectual professionals and a successful entrepreneur in the field of Computer Science and Information Technology to meet the current challenges in the fast-growing IT industry.

MISSION OF THE DEPARTMENT	
M1	To provide a strong theoretical and practical knowledge to the students in computer science discipline.
M2	To equip our students to attain skill set imperative to harness the opportunities present in this dynamic environment.
M3	To provide technical & skill-based quality training to the students in the field of Information Technology.
M4	To empower the Youth in rural communities with computer knowledge.
M5	To inculcate knowledge about socio-economic duties & responsibilities, human & ethical values to become an optimistic global citizen and a life-long learner.
M6	To provide environmental education to empower knowledge on ecological issues and to protect and conserve invaluable natural resources for healthy and sustainable livelihoods.

PROGRAMME EDUCATIONAL OUTCOMES (PEO)	
PEO1	**Global Competence**: Develop into globally competent computer professionals capable of excelling in diverse, multidisciplinary domains. This includes mastering technica skills while also cultivating adaptability, cultural awareness, and effective communication across international contexts.
PEO2	**Social Commitment and Ethical Values:** Excel as individuals dedicated to upholding social responsibility, ethical values, and empathy for addressing societal needs. This commitment involves integrating ethical considerations and contributing positively to communities through thoughtful and compassionate actions.
PEO3	**Entrepreneurship and Leadership**: Become entrepreneurs with robust leadership skills, adept at delivering innovative solutions and developing software products. This entails fostering creativity, managing teams effectively, and navigating challenges to bring impactful software solutions to market.
PEO4	**Lifelong Learning**: Engage in lifelong learning to continuously update knowledge and skills in the rapidly advancing fields of computer applications and emerging technologies. This commitment ensures staying current with the latest advancements and enhancing expertise to meet evolving industry demands.
PEO5	**Quality Technical Training**: Deliver high-quality technical and skill-based training to students in the field of information technology, focusing on imparting comprehensive knowledge, practical skills, and preparing them for professional challenges in the industry.

PROGRAMME OUTCOMES (PO)	
PO1	**Understanding Comprehensive and Coherent Knowledge:** Understand your area of study within a broad multidisciplinary context by staying informed about current and emerging developments in the field. This approach allows for a comprehensive view integrating knowledge from various disciplines to enhance expertise and adaptability.

PO2	**Problem-Solving Ability:** Apply learning skills to real-life situations by analysing and solving various problems. Tackle complex issues by developing solutions with appropriate computational techniques and tools.
PO3	**Analytical and Logical Reasoning:** Apply analytical thought by identifying relevant implications and using them to formulate coherent arguments. Systematically evaluate evidence to draw logical conclusions and construct persuasive reasoning.
PO4	**Critical Thinking:** Apply analytical thought by identifying relevant implications and using them to formulate coherent arguments. Systematically evaluate evidence to draw logical conclusions and construct persuasive reasoning.
PO5	**Creativity:** To create, perform, and think in diverse ways, develop creative thinking and problem-solving skills through techniques like brainstorming, design thinking, and empathy mapping. Challenge assumptions and use analogies to foster out-of-the-box thinking. Collaborate with diverse teams to gain multiple perspectives and generate innovative solutions to complex problems.
PO6	**Professional and Ethical Responsibility:** Recognize and adhere to ethical standards and professional responsibilities by engaging in courses that include group discussions and debates on ethical practices and human values. These activities sensitize students on interacting with customers and colleagues within the organization. Demonstrate awareness of ethical and legal issues related to information technology and consistently adhere to professional codes of conduct.
PO7	**Communication Skills:** Proficiently convey ideas in English by effectively communicating with both technical and non-technical stakeholders. This include delivering clear oral presentations, writing precise technical documentation, and creating comprehensive project reports.
PO8	**Engage in lifelong and self-learning:** Acquiring new knowledge and skills, including learning how to learn techniques, essential for continuous personal development and achieving economic, social, and cultural objectives. Continuously update your knowledge and skills in the rapidly evolving field of computer applications and information technology through self-paced and self-directed learning.

PO9	**Leadership and Team-Based Projects:** Students undertake team projects to foste collaborative work and synergy. This involves formulating an inspiring vision, building cohesive teams aligned with that vision, and motivating members to actively engage Utilizing management skills, leaders guide their teams effectively toward achieving shared goals and milestones.
PO10	**Research Related Skills:** Acquire an understanding of basic research ethics and develop skills to apply ethical principles in personal research regardless of the funding source o field of study. This involves adhering to ethical guidelines and ensuring integrity in conducting research activities.

PROGRAMME SPECIFIC OUTCOMES (PSO)	
PSO1	**Fundamental Computer Concepts:** Gain a robust understanding of fundamental computer concepts through both theoretical learning and practical application across diverse fields. This involves acquiring knowledge that spans foundational principles and hands-on experience, ensuring proficiency in various aspects of computing.
PSO2	**Interdisciplinary Knowledge Application:** Effectively apply knowledge o mathematics, computer science, and management in practical applications. This involve integrating theoretical understanding with real-world scenarios to solve complex problems and make informed decisions in diverse contexts.
PSO3	**Problem Solving with Latest Technologies:** Analyse and leverage the latest technologies to effectively address challenges within computer applications. This entails staying abreast of advancements, assessing their applicability, and implementi ng innovative solutions to enhance performance and functionality.
PSO4	**Software Development Skills:** Develop software applications and tools by employing both quantitative and qualitative techniques. Design computing systems that fulfil specific requirements while adhering to practical constraints such as safety, security, and usability. This approach ensures the creation of robust solutions that effectively meet user needs and operational objectives.

PSO5	**Practical Skills for Industry Solutions:** Develop practical skills aimed at providing innovative solutions to challenges in industry, society, and business. This involves honing technical expertise, fostering creativity, and applying problem-solving methodologies to address real-world issues effectively and sustainably.
PSO6	**Communication and Collaboration:** Communicate effectively and collaborate within multidisciplinary teams to achieve shared goals in software development projects. This involves fostering clear communication channels, leveraging diverse perspectives, and coordinating efforts to deliver high-quality solutions that meet project objectives efficiently.
PSO7	**Professionalism and Ethics:** Demonstrate awareness of ethical and legal issues in information technology, adhering to professional codes of conduct. Continuously update skills and knowledge in the dynamic field of computer applications and information technology to stay current with industry advancements and best practices.
PSO8	**Practical Application and Project Management:** Apply theoretical knowledge to practical applications through internships, capstone projects, or industrial training. Manage software development projects by overseeing project planning, scheduling, budgeting, and implementing risk management practices. This hands-on experience ensures effective application of skills and prepares for real-world challenges in the field

BOARD OF STUDIES

List of Members Department of Computer Applications (UG)

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.Ananthapadmanaban	Professor & Dean, FSH, SRM Institute of Science & Technology, Chennai.	Academic Expert (External Member)
4.	Dr.D.Ethiraj	Director I/C, C-DAC,Chennai	External Member (Industry Expert)
5	Dr.P.Sujatha	Professor & Head, Department of BCA, VISTAS.	Internal Member
6	Dr.K.Rohini	Professor, Department of Computer Applications-UG VISTAS	Internal Member
7	Dr.J.Jebathangam	Professor, Department of Computer Applications-UG VISTAS	Internal Member
8	Dr.S.Kamalakkannan	Professor, Department of Computer Applications - UG VISTAS	Internal Member
9	Dr.K.Dharmarajan	Professor, Department of Computer Applications -UG VISTAS	Internal Member
10	Dr.S.Jeyalaksshmi	Professor, Department of Computer Applications - UG VISTAS	Internal Member
11	Dr.R.Bagavathy Lakshmi	Associate Professor, Department of Computer Applications- UG VISTAS	Internal Member
12	Dr.V.Ragavendran	Assistant Professor, Department of Computer Applications - UG VISTAS	Internal Member
13	Dr.U.Hemamalini	Assistant Professor, Department of Computer Applications - UG VISTAS	Internal Member
23	Vishnu.P.V	Chief Innovation officer, Xerago, Digital Impact Consulting &Services, Chennai.	Alumni Member

CREDIT DISTRIBUTION

BCA (Hons)

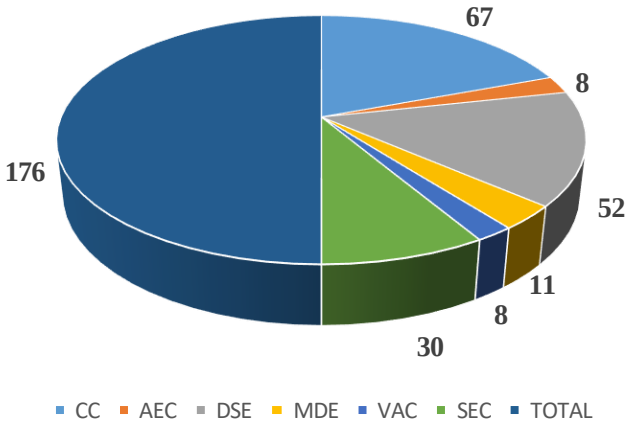
Minimum credits to be earned: 176

BCA

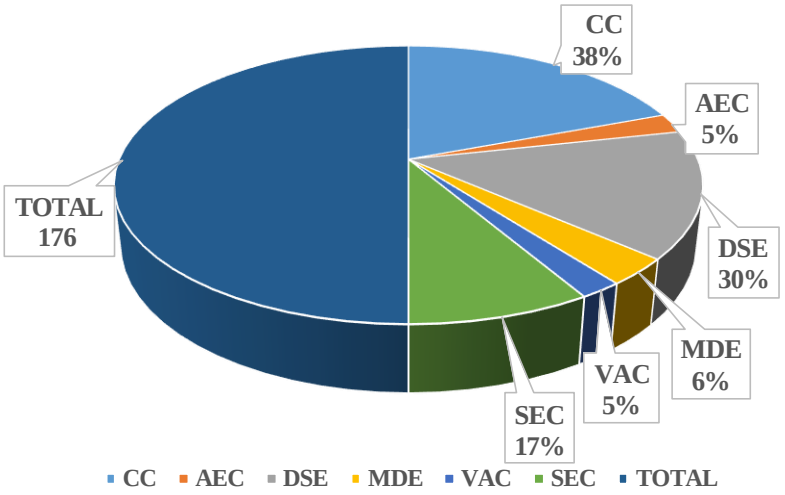
Minimum credits to be earned: 132

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
CORE COURSE(CC)	11	12	13	15	6	5	62	5	-	67
ABILITY ENHANCEMENT COURSE(AEC)	4	4	-	-	-	-	8	-	-	8
DISCIPLINE SPECIFIC ELECTIVE(DSE)	-	-	3	3	10	12	28	10	14	52
MULTI - DISCIPLINARY ELECTIVE (MDE)	3	3	2	-	-	-	8	3	-	11
VALUE ADDED COURSE (VAC)	3	1	2	2	-	-	8	-	-	8
SKILL ENHANCEMENT COURSE(SEC)	2	2	2	2	6	4	18	4	8	30
TOTAL CREDIT	23	22	22	22	22	21	132	22	22	176

CREDIT DISTRIBUTION



CREDIT PERCENTAGE DISTRIBUTION



ABBREVIATIONS

CC	CORE COURSE
AEC	ABILITY ENHANCEMENT COURSE
DSE	DISCIPLINARY SPECIFIC ELECTIVE
MDE	MULTI -DISCIPLINARY ELECTIVE
VAC	VALUE ADDED COURSE
SEC	SKILL ENHANCEMENT COURSE

CURRICULUM STRUCTURE

BCA (Hons) - Four Years

/

BCA - Three Years

Total number of Credits: 176

BCA (Hons) Minimum Credits to be earned :176

BCA Minimum Credits to be earned: 132

SEMESTER 1

			Hours/Week					Maximum Marks		
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
AEC	24LTAM11 / 24LHIN11/ 24LFRE11	Tamil I / Hindi I/ French I	2	0	0	1	2	40	60	100
AEC	24LENG11	English I	2	0	0	1	2	40	60	100
CC	24SBCA11	Problem Solving Techniques using C	3	0	0	2	3	40	60	100
CC	24CBCA11	Data Structures	3	0	0	2	3	40	60	100
CC	24CBCA12	Digital Logic and Computer Architecture	3	0	0	2	3	40	60	100
MDE	24BMA001	Mathematics- I	2	1	0	2	3	40	60	100
CC LAB	24PBCA11	Problem Solving Techniques using C LAB	0	0	2	1	1	40	60	100
CC LAB	24PBCA12	Data structures lab	0	0	2	1	1	40	60	100
VAC	24SBAC12	Web Programming	0	0	2	1	1	40	60	100
VAC	24DVAC12	Communication Skills	2	0	0	0	2	40	60	100
SEC	24SSKU11	Soft Skills I	2	0	0	1	2	40	60	100

SEC	Orientation programme /Industrial Visit	-	-	-	-	-	-	-	-
TOTAL		**19**	**1**	**6**	**-**	**23**	**-**	**-**	**-**

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
AEC	24LTAM21/ 24LHIN21/ 24LFRE21	Tamil II / Hindi II / French II	2	0	0	2	2	40	60	100
AEC	24LENG21	English II	2	0	0	2	2	40	60	100
CC	24SBCA21	Object Oriented Programming using C++	3	0	0	2	3	40	60	100
CC	24CBCA21	Open Source Technologies	3	0	0	2	3	40	60	100
MDE	24CBCA22	Mathematics – II	2	1	0	2	3	40	60	100
CC LAB	24PBCA22	Object Oriented Programming lab using C++	0	0	3	1	1	40	60	100
CC LAB	24PBCA21	Open Source Technologies Lab	0	0	3	1	1	40	60	100
VAC	24DVAC21	Universal Human Values	1	0	0	1	1	40	60	100
CC	24SBCA22	Computer Graphics and Multimedia	4	0	0	2	4	40	60	100
SEC	24SSKU21	Soft Skills II	2	0	0	1	2	40	60	100
			19	**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 3										
			Hours/Week					Maximum Marks		
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
CC	24CBCA31	Programming in Java	4	0	0	2	4	40	60	100
CC	24CBCA32	Data Base Management System	3	0	0	2	3	40	60	100
CC	24CBCA33	Probability and Statistics	3	0	0	2	3	40	60	100
DSE	24DBCA31	Discipline Specific Elective I	3	0	0	2	3	40	60	100
CC LAB	24PBCA31	Programming in Java Lab	0	0	4	1	2	40	60	100
CC LAB	24PBCA32	Relational Data Base Management System Lab	0	0	4	1	2	40	60	100
VAC	24PVAC31	Yoga And Physical Fitness/Sports/ NCC/NSS/ Disaster Management	0	0	4	1	2	40	60	100
MDE	24EMDE31	Indian Knowledge System	2	0	0	1	2	40	60	100
SEC	24SSKU13	Soft skills III	1	1	0	1	2	-	100	100
TOTAL			**16**	**1**	**12**	**-**	**23**	**-**	-	

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

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

SEMESTER 4										
			Hours/Week					Maximum Marks		
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
CC	24CBCA41	Python Programming	4	0	0	2	4	40	60	100
CC	24CBCA42	Artificial Intelligence	3	0	0	2	3	40	60	100
CC	24CBCA43	Design and Analysis of Algorithm	3	0	0	2	3	40	60	100
CC	24CBCA44	Computer Networks	3	0	0	2	3	40	60	100
DSE	24DBCA41	Discipline Specific Elective II	3	0	0	2	3	40	60	100
CC LAB	24PBCA41	Python Programming Lab	0	0	2	1	1	40	60	100
CC LAB	24PBCA42	Artificial Intelligence using Python Lab	0	0	2	1	1	40	60	100
VAC	24DVAC41	EVS	2	1	0	1	2	40	60	100
SEC	24SSKU41	Design Thinking and Innovation	1	1	0	1	2	-	100	100
TOTAL			**19**	**2**	**4**	**-**	**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**
CC	24CBCA51	Natural Language Processing	3	1	0	2	4	40	60	100
DSE	24DBCA51	Discipline Specific Electives III	3	0	0	2	3	40	60	100
DSE	24DBCA52	Discipline Specific Electives IV	3	2	0	2	5	40	60	100
CC LAB	24PBCA51	Natural Language Processing Lab	0	0	4	1	2	40	60	100
DSE LAB	24PBCA52	Discipline Specific Electives III Lab	0	0	4	1	2	40	60	100
SEC	24SSKU51	Quantitative Techniques	0	2	0	1	2	-	100	100
SEC	24SSKU52	Internship – 1	0	0	8	2	4	-	100	100
SEC		Major Project [evaluation in sixth semester]	-	-	-	-	0	-	-	-
TOTAL			**9**	**5**	**16**	**-**	**22**	-	-	-

CIA - Continuos 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**
CC	24CBCA61	Generative AI	4	1	0	2	5	40	60	100
DSE	24DBCA61	Discipline Specific Electives – V	3	2	0	2	5	40	60	100
DSE	24DBCA62	Discipline Specific Electives – VI	3	2	0	2	5	40	60	100
DSE LAB	24PBCA62	Discipline Specific Electives – V Lab	0	0	4	1	2	40	60	100
SEC	24SSKU61	Major Project [Initiated in 5th Semester]	0	0	8	2	4	40	60	100
TOTAL			**10**	**5**	**12**	**-**	**21**	-	-	-

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**
MDE	24MDE71	Advanced Statistical methods for Data Science	3	0	0	2	3	40	60	100
CC	24CBCA71	Python for Data Science	3	2	0	2	5	40	60	100
DSE	24DBCA72	Discipline Specific Electives – VII	3	2	0	2	5	40	60	100
DSE	24DBCA73	Discipline Specific Electives – VIII	3	2	0	2	5	40	60	100
SEC		Dissertation work [evaluation in Eight semester]	-	-	-	-	-	-	-	-
SEC	24SSKU72	Internship – 2	0	0	8	2	4	40	60	100
TOTAL			**12**	**6**	**8**	**-**	**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**
DSE	24DBCA81	Discipline Specific Electives –I X	3	2	0	2	5	40	60	100
DSE	24DBCA82	Discipline Specific Electives – X	3	2	0	2	5	40	60	100
DSE	24DBCA83	Discipline Specific Electives – XI	3	1	0	2	4	40	60	100
SEC	24SSKU81	Dissertation Work	0	0	16	2	8	40	60	100
TOTAL			**9**	**5**	**16**	**-**	**22**	-	-	-

CIA - Continuous Internal Assessment SEE - Semester End Examination

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

CORE COURSES

Category	Course	L	T	P	O	C
CC	Problemsolving Techniques using C	3	0	0	2	3
CC	Data Structures	3	0	0	2	3
CC	Digital Logic and Computer Architecture	3	0	0	2	3
CC	Problemsolving Technique using C lab	0	0	2	1	1
CC	Data Structures using C lab	0	0	2	1	1
CC	Object oriented programming using C++	3	0	0	2	3
CC	Open Source Technologies	3	0	0	2	3
CC	Object oriented programming lab using C++	0	0	2	1	1
CC	Open Source Technologies	0	0	2	1	1
CC	Computer Graphics and Multimedia	4	0	0	2	4
CC	Programming in Java	4	0	0	2	4
CC	Database Management System	3	0	0	2	3
CC	Programming in Java lab	0	0	4	1	2
CC	Relational Database Management System lab	0	0	4	1	2
CC	Python Programming	4	0	0	2	4
CC	Artificial Intelligence	3	0	0	2	3
CC	Design and Analysis of Algorithm	3	0	0	2	3
CC	Computer Networks	3	0	0	2	3
CC	Python Programming lab	0	0	2	1	1
CC	Artificial Intelligence using Python lab	0	0	2	1	1

CC	Natural Language Processing	3	1	0	2	4
CC	Natural Language Processing lab	0	0	4	1	2
CC	Generative AI	4	1	0	2	5
CC	Python for Data science	3	2	0	2	5

DISCIPLINESPECIFIC ELECTIVE COURSES

Category	Course	L	T	P	O	C
DSE –I	Financial Accounting	3	0	0	2	3
	Grid Computing	3	0	0	2	3
DSE -II	Software Engineering	3	0	0	2	3
	Ethical Hacking	3	0	0	2	3
DSE -III	Introduction to ML	3	0	0	2	3
	Cloud Technology	3	0	0	2	3
DSE III LAB	Machine learning lab	0	0	4	1	2
DSE III LAB	Cloud Technology lab	0	0	4	1	2
DSE -IV	Cyber Security	3	2	0	2	5
	UI and UX design	3	2	0	2	5
DSE -V	Big data Analytics	3	2	0	2	5
	Advanced Data Visualization	3	2	0	2	5
DSE –V LAB	Big data Analytics lab	0	0	4	1	2
	Data Visualization lab	0	0	4	1	2
DSE -VI	Exploratory Data Analysis	3	2	0	2	5
	Edge Computing	3	2	0	2	5

DSE -VII	Business Intelligence and Analytics	3	2	0	2	5
	Data Warehousing and Data Mining	3	2	0	2	5
DSE -VIII	Predictive Analysis	3	2	0	2	5
	Deep learning	3	2	0	2	5
DSE -IX	Operating Systems	3	2	0	2	5
	Neural Network	3	2	0	2	5
DSE -X	Introduction to Data Science	3	1	0	2	4
	Network Security	3	1	0	2	4
DSE -XI	Time Series Analysis	3	1	0	2	4
	Full Stack Web development	3	1	0	2	4

ABILITY ENHANCEMENT COURSE

Category	Course	L	T	P	O	C
AEC	Tamil I / Hindi I/ French I	2	0	0	1	2
AEC	English I	2	0	0	1	2
AEC	Tamil II / Hindi II / French II	2	0	0	2	2
AEC	English II	2	0	0	2	2

MULTIDISCIPLINARY ELECTIVE

Category	Course	L	T	P	O	C
MDE	Mathematics- I	2	1	0	2	3
MDE	Mathematics – II	2	1	0	2	3
MDE	Indian Knowledge System	2	0	0	1	2
MDE	Advanced Statistical methods for Data Science	3	0	0	2	3

VALUE ADDED COURSES

Category	Course	L	T	P	O	C
VAC	Web Programming	0	0	2	1	1
VAC	Communication Skills	2	0	0	0	2
VAC	Universal Human Values	1	0	0	1	1
VAC	Yoga Education / NSS / NCC	0	0	4	1	2
VAC	Environmental Studies	2	0	0	1	2

SKILL ENHANCEMENT COURSES

Category	Course	L	T	P	O	C
SEC	Soft Skills I	2	0	0	1	2
SEC	Orientation Programme / Industrial Visit	-	-	-	-	-
SEC	Soft Skills II	2	0	0	1	2
SEC	Soft Skills III	1	1	0	1	2
SEC	Design Thinking and Innovation	1	1	0	1	2
SEC	Quantitative Techniques	0	2	0	1	2
SEC	Internship – 1	0	0	8	2	4

SEC	Major Project	0	0	8	2	4
SEC	Internship -2	0	0	8	2	4
SEC	Dissertation work	0	0	16	2	8

SEMESTER I

L	T	P	O	C
2	0	0	1	2

பாடக் குறியீட்டு எண்: 24LTAM11

பருவம்-1, தமிழ்மமாழிப்பாடம்-1, பகுதி-1, தகுதிப்புள்ளி: 2, வாரப் பாட நேரம்: 2. தாள்-1

மமாழிவரலாறு – சங்க இலக்கியம் – அற இலக்கியம் – மமாழித்திறன்

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய ோ்ாாாட்டத்தத நமம்படுத்Fதல், தற்கால தமிழ் இலக்கிய வதகதமகளான மரபுக்கவிதத, புFக்கவிதத, உதேரதட ஆகியவற்தற அறிமுகப்படுத்Fதல், தமிழர்தம் வாழ்வியல் ேமறிகதளயும் பண்பாட்டுச் மசழுதமகதளயும் இன்தறய ததலமுதறயினர் அறியச் மசய்தல், மாணவர்களுக்குத் தமிதழத் தவறின்றி எழுFவதற்குத் நததவயான பயிற்சி அளித்F அவர்களின் மமாழித்திறதன நமம்படுத்Fதல், மசய்யுளின்

ோ்லத்ததப் பாராட்டும் முதறதமமதய அறியச் மசய்F அதன்வழி சிந்ததன வளத்ததப் மபருகச் மசய்தல் என்பனவும் நமற்கண்டவழி மாணவர்கதள ஆளுதம மிக்கவர்களாக உருவாக்கி, நபாட்டித்நதர்வுகளுக்குத் தயார் மசய்F அவர்களுக்கு நவதலவாய்ப்தப உருவாக்குவFம் இந்தப் பாடத்திட்டத்தின் முக்கிய ோநாக்கமாகும்.

அலகு- 1: தமிழ் மமமாழி வரமலாறு **8மணி நேரம்**

மமமாழிக்குடும்பம் - இந்திய மமமாழிக்குடும்பங்கள் - இந்திய ஆட்சி மமமாழிகள் - திமராவிட மமமாழிக்குடும்பங்கள் - திமராவிட மமமாழிகளின் வகககள் –திமராவிட மமமாழிகளின் சிறப்புகள் - திமராவிட மமமாழிகளின் வழங்கிடங்கள் - திமராவிட மமமாழிகளுள் தமிழின் இடம் - தமிழ்மமமாழியின் சிறப்புகள் - தமிழ் பிறமமமாழித் மமதாடர்புகள்.

அலகு -2 **8 மணி நேரம்**

புோமறானூறு- மபாடல் எண்: , 182, 183, – இரண்டு

மபாடல்கள். குறுந்மமதாகக- மபாடல் எண்: 2, 167, - இரண்டு

மபாடல்கள் மபரிமபாடல் - முருகன். கவகய - இரண்டு

மபாடல்கள்

அலகு - 3 அற இலக்கியங்கள் **07 மணி நேரம்**

திருக்குறள்- மவான்சிறப்பு (அறம்), மபருகம (மபாருள்), மபிரிமவாற்மறாகம (இன்பம்),. மூன்று அதிகாரங்கள் முழுதமயும்

1. ோ்ாாாலடியார் - இரண்டு பாடல்கள். (2, 3)
2. மூFதர - இரண்டு பாடல்கள். (2, 8)

அலகு 4 மமமாழி **07 மணி நேரம்**

பிகழ ோ்ா க்கி எழுFதல் - ஒற்றுப்பிகழ ோ்ா க்கி எழுFதல் - மமதாடர்பிகழ ோ்ா க்கி எழுFதல் - ஒற்று மிகும் இடங்கள் - ஒற்று மிமகா இடங்கள் - பிற மமமாழிச் மமசாற்ககள ோ்ா க்கி எழுFதல் – பயிற்சிகள்.

மமாத்தம்: 30 மணி நேரம

பார்தவ நூல்கள்

1. **தமிழர் நாாகரிகமும் பண்பாடும்,** டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திதணப் பதிப்பகம், 2001.
2. **தவறின்றித் தமிழ் எழுF ோவாம்**, மா. ோன்னன், ஏகம் பதிப்பகம், 1999.
3. **தவறின்றித் தமிழ் எழுத** - மருதூர் அரங்கராசன், ஐந்திதணப் பதிப்பகம், 2003.
4. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., புF தில்லி : சாகித்திய அக்காமதமி, 2002.
5. **புதிய தமிழ் இலக்கிய வரலாறு**, ோ்ா ல. பத்ோமாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாமடமி, 2007.
6. **மசம்மமாழி தமிழின் சிறப்பியல்புகள்** - முதனவர் மதறமதல இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
7. **பாடநூல் ோதடலுக்கான இதணயம் -** https://archive.org/

24LHIN11 **HINDI I**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To enable the students to develop communication Skills.
- To train students in official language.
- To enrich their knowledge in Hindi Literature.
- To teach them human values & create awareness towards importance of tourism.
- To share the knowledge of their native place.
- To teach them to use Azhagi (Prose, Letter Writing & Functional Words**).**

UNIT 1: 'Smruti' (Kahani) by Pandit Sriram Sharma. **6**

UNIT 2: 'Athiti tum kab jaaoge' (Vyangy) by Harishankar Parsayi. **6**

UNIT 3: 'Atatho Ghumakkad Jigyasa' (Yatra Vruthanth) by Rahul Sanskrityayan. **6**

UNIT 4: Functional Hindi-Phrases use in Letter Writing. Skill development **6**

- Bhav Ek Bhasha Anek.

UNIT 5: Letter Writing- Intro. & Types & 3 Personal Letters. **6**

Introduction to Azhagi, Azhagi + fonts.

Total Hours : 30 ,

COURSE OUTCOMES:

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

CO1: Gain knowledge about the olden system of communication, the olden living style existed in the villages, human values, giving due respect to other living beings, thril ler style of storytelling.

CO2: Understand to maintain their limits among their familiar circle and social responsibility.

CO3: Understand importance of exposure to various culture, human values and develop goodcharacter.

CO4: Know the Functional words in Hindi, various culture and languages of India.

CO5: Gain knowledge in drafting personal letters, equip themselves to Hindi typing thereby creatingself-employment.

TEXT BOOKS / REFERENCE BOOKS / WEB SOURCES:

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.html

L	T	P	O	C
2	0	0	1	2

24LFRE11 **FRENCH I**

COURSE OBJECTIVES:

The lessons are being chosen:

- To Greet, To Express Excuse And To Introduce Oneself
- To Introduce Another Person
- To Express His/Her Ideas, Opinions And Weekend Projects
- To Request Someone To Do Something, Polite Manners
- To Accept, Refuse, Enquire And Indicate The Time And Date
- To Express Himself / Herself In Positive And Negative Manner

UNIT 1:Salut **4**

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

UNIT 2:Enchanté **6**

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

UNIT 3:J'Adore **4**

La negation, l'adjectif possessif, le futur proche

UNIT 4:Tu veux bien **7**

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

UNIT 5: On se voit quand **5**

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

UNIT 6:Bonne idée **4**

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

Total Hours-:30

COURSE OUTCOMES:

At the end of this course Students will be able to

CO1: The students would be able to greet, to excuse and to introduce himself

CO2: The students would be able to introduce someone

CO3: The students would be able to express his ideas, opinions and weekend projects

CO4: The students would be able to ask someone to do something, polite manner

CO5: The students would be able to accept, refuse enquire and indicate the time and date

CO6: The students would be able to express himself in positive and negative manner

TEXT / REFERENCE BOOK:

1. Prescribed book: LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau
2. Reference book: SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, CatherineHoussa,ÉmilieKasazian

L	T	P	O	C
2	0	0	1	2

24LENG11 **ENGLISH I**

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 1: PROSE 6

Dangers of drug abuse - Hardin B.Jones

Tight corners - E.V.Lucas

UNIT 2: POETRY 6

Ecology - A.K.Ramanujan

The owl and the chimpanzee - Jo Camacho

UNIT 3: SHORT STORY 6

The Dear Departed - Stanley Houghton

The Fool's Paradise- Isaac Bashevis Singer

UNIT 4: GRAMMAR 6

Parts of speech, Articles

UNIT 5: GRAMMAR 6

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

Total Hours: 30

COURSE OUTCOMES:

On completion of this course, Students can able 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. English for Communication Enrichment: by Jeya Santhi June 2015.
2. Dr. M. Narayana Rao and Dr. B. G.Barki–Anu's Current English for Communication (AnuChitra). June 2012.
3. Dr. Ananthan, R. Effective Communication. Ed. Chennai: Anu Chithra Pub.2010.

24SBCA11 **PROBLEM SOLVING TECHNIQUES USING C**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To introduce foundational problem-solving strategies using algorithms, flowcharts, and pseudocode, and to analyze algorithmic efficiency using time complexity.
- To develop proficiency in C programming including data types, control structures, functions, arrays, pointers, structures, and file handling.
- To enable students to implement algorithmic solutions in C, emphasizing modularity, memory management, and file-based data processing.

UNIT- I INTRODUCTION TO PROBLEM SOLVING 9

Understand the **Problem-Solving approach** using algorithms, flowcharts, and pseudocode - Programs andalgorithm - The Role of Algorithms in Computing - Algorithms as a technology - analyzing algorithms, Designing algorithms - Growth of Functions. Explore the concept of time complexity to analyze and evaluate algorithm efficiency.Study various algorithms - their design - analysis and implementation in C programming.Design flowcharts and write pseudocode to represent algorithmic solutions systematically.

UNIT- II INTRODUCTION TO C PROGRAMMIMG 9

Overview of C: C History and Background - C Program Structure - . **Constants,Variables & Data Types:** Character Set - C Tokens: Keywords and Identifiers - Constants - Variables - .Declaring data Variables - Variable Types - Format of Variable declaration - Intialization of Variables, Assigning Values to Variables - Constans and its types.- Defining Symbolic Constants **-Operators and Expression**

:Arithmetic Operators, Logical - Relational - Assignment - Increment & Decrement - Conditional - Special Operators - Bit wise & Shift Operators-Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity.

UNIT-III CONTROL STRUCTURES & ARRAY 9

Input and Output: Standard input and output - Formatted output- Printf, variable length argument list- Formatted input-Scanf - **Simple C Programs** - **Conditional Satements :** If Statement -Simple IF- Evaluation of Multiple Statements - The IF Else Statement - The ELSE IF Ladder - Nested IF**.**

Looping Statements: The While Statement - The Do -While Statement - For Statement - Nested For - **S**witchStatement - Break and Continue - The Comma Operator & Goto Statement- **Array :** Declaration of Array- Initialization of Array - Single Dimensional & Two Dimensional-Examples.

UNIT-IV FUNCTIONS & POINTERS 9

User-defined Functions: Need for functions - Elements of User-defined Functions - Definition of Functions,Return Values and their Types - Function Calls - Function Declaration - Category of Functions - No Arguments and no Return Values - Arguments but no Return values - Arguments with Return Values - No Arguments but Returns a Value - Passing Arrays to Functions - Recursion, The Scope, Visibility and Lifetimeof variables. **Pointers:** Introduction, Declaring Pointer Variables, Initialization of Pointer variables, accessinga Variable through its Pointer, Pointer Expressions - Pointer Increments and Scale Factor.

UNIT– V STRUCTURES AND FILE MANAGEMENT 9

Structures: Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures.

File Management in C: Introduction, Defining and opening a file, closing a file, Input/output and Error Handling on Files.

Total Hours: 45

COURSE OUTCOMES:

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

CO1: Develop algorithmic solutions using flowcharts and pseudocode and analyze their time complexity.

CO2: Write, compile, and debug C programs using appropriate syntax, variables, and operators.

CO3: Implement conditional, looping structures, and arrays to solve computational problems.

CO4: Create modular programs using functions and manage memory effectively using pointers.

CO5: Manage data using structures and perform file input/output operations in C.

TEXT BOOKS:

1. **Ray Dowson ,"Programming in ANSI C", 3rd Edition ,** Loughborough University InstitutionalRepository , ISBN 1-874152-10-1
2. **E. Balaguruswamy, "Programming in ANSI C"**, 8th Edition, 2019, McGraw HillEducation, ISBN: 978-93-5316-513-0

REFERENCE BOOK:

1. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, OxfordUniversity Press, ISBN: 978-01-9949-147-6.
2. Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
3. Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978-93-8728- 449-
4. Jacqueline A Jones and Keith Harrow, "Problem Solving with C", Pearson Education. ISBN: 978-93-325-3800-9.
5. Dr. Guruprasad Nagraj, "C Programming for Problem Solving", Himalaya Publishing House. ISBN-978-93-5299-361-1.

WEBSITES:

1. **www.w3schools.com**
2. www.tutorialspoint.com
3. www.javapoint.com
4. www.geeksforgeeks.org

WEB SOURCES:

1. https://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf
2. https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf
3. http://mars.tekkom.dk/w/images/4/42/6272_cnote.pdf
4. https://www.slideshare.net/gauravjuneja11/c-language-ppt
5. https://www.electronicshub.org/basics-of-embedded-c-program/
6. https://www.mygreatlearning.com/blog/embedded-c

24CBCA11 **DATA STRUCTURES**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To provide a strong foundation in data organization principles and enable students to understand the operations of various data structures including arrays, linked lists, stacks, queues, trees, and graphs.
- To teach students how to analyze time and space complexity of algorithms and apply asymptotic notations to evaluate performance.
- To develop skills in implementing searching, sorting, and hashing techniques, and applying these concepts in real-world problem-solving using C programming.

UNIT I: INTRODUCTION TO DATA STRUCTURES 7

Introduction and Overview: Definition, Elementary data organization, Data Structures, data Structures operations, Abstract data types, algorithms complexity, time-space trade off. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms. Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory,Traversing Linear arrays, Inserting and deleting, .

UNIT II : LINKED LIST 8

Linked list: Definition, Representation of Singly Linked List in memory,Traversing a Singly linked list, Searching in a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list.

UNIT III : STACK & QUEUE 8

Stacks: Representation of Stack - Stack Operations - Applications - Recursion. Queues: Operations on Queues- Application & Representation - Circular Queues, Dequeue, Priority Queues.

UNIT IV : TREES & GRAPHS 10

Trees: Definition and Basic Terminologies, Representation of Trees, Binary Trees, Types of Tree, Representation of Binary Trees, Binary Tree Traversals, Threaded Binary Trees, Binary Search Trees and Operations, AVL Trees, Heap, B-Trees, B+ Trees. **Graph :**Definitions and Basic Terminologies, Representation of Graphs, Graph Traversals, Operations on Graphs, Shortest Path Problem (Warshall's Algorithm and Dijkstra's Algorithm), Minimum Spanning Tree (Prim's and Kruskal's Algorithm)

UNIT V : SORTING , SEARCHING & HASHING 12

Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort, Heap Sort, Linear and Binary Searcht.Hashing: Hash functions, Collision Resolution, Implementation using Linear and Quadratic Probing, Chaining using C.

Total Hours: 45

COURSE OUTCOMES:

On Completion of the course, students will able to,

CO1: Understand the fundamental concepts of data structures, algorithm complexity, and memory organization.

CO2: Apply linear data structures (arrays and linked lists) for basic data manipulation operations.

CO3: Implement and use stack and queue data structures for algorithm design, including recursive solutions.

CO4: Construct and manipulate non-linear data structures like trees and graphs, and solve related problems.

CO5: Analyze and apply various sorting, searching, and hashing techniques for efficient data processing.

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2 nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed,Universities Press.
2. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
3. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, andClifford Stein.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan,Cengage Learning.

WEB SOURCES:

1. http://www.suite101.com/reference/data_structure_tutorial
2. http://warrior-101.tripod.com/dstut/dstut.htm
3. http://www.cplusplus.com/doc/tutorial/structures/
4. http://www.theparticle.com/javadata2.html

24CBCA12 DIGITAL LOGIC & COMPUTER ARCHITECTURE

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To introduce the fundamental concepts of number systems, binary arithmetic, and Boolean algebra for digital systems.
- To develop the ability to simplify Boolean expressions using Karnaugh maps and implement logic functions using logic gates.
- To impart knowledge of combinational and sequential logic circuits and their role in the design of a basic computer system.

UNIT – I: NUMBER SYSTEM 10

Digital Systems, Binary Numbers, Number base conversions, Octal, Hexadecimal and other base numbers, complements, signed binary numbers, Floating point number representation, binary codes, Error detection and correction, binary storage and registers, binary logic, Boolean algebra and logic gates , Basic theorems and properties of Boolean Algebra, Boolean functions, canonical and standard forms, Digital Logic Gates.

UNIT – II: K MAP & LOGIC GATES 10

The K-Map Method, Three-Variable Map, Four Variable Map, Five-Variable Map, sum of products, product of sums simplification, Don't care conditions , NAND and NOR implementation and other two level implementations, Exclusive-OR function.

UNIT – III: COMBINATIONAL LOGIC CIRCUIT 8

Combinational circuit: Binary Adder, Subtractor, Decimal Adder, Decoders, Encoders, Multiplexers, De-multiplexers .

UNIT – IV: SEQUENTIAL CIRCUIT 7

Sequential Circuit: Latches, Flip-flops, analysis of clocked sequential circuits, Registers, Shift registers, Ripple counters, Synchronous counters, other counters

UNIT – V: BASIC COMPUTER DESIGN 10

Basic Model of a Computer, Computer Components, Register transfer and Microoperations: Register Transfer Language ,Register Transfer , Bus and Memory Transfers, Arithmetic Microoperations , Logic Microoperations , Shift Microoperations , Arithmetic Logic and Shift Unit. Instruction codes, Computer registers, Computer Instruction, Timing and control, Instruction cycle, Memory reference instructions, Input output and Interrupt, Design of basic computer, Design of Accumulator logic.

Total Hours: 45

COURSE OUTCOMES:

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

CO1: Understand and apply different number systems, binary arithmetic, and logic gates in digital electronics.

CO2. Analyze and simplify Boolean functions using Karnaugh Maps and realize them using logic gates.

CO3. Design and analyze combinational circuits such as adders, subtractors, multiplexers, and decoders.

CO4. Explain the working of sequential circuits including flip-flops, counters, and shift registers.

CO5. Describe the basic architecture and operational flow of a computer system using register transfer and micro-operations.

TEXT BOOKS:

1. Digital Design, M. Morris Mano, M.D.Ciletti, 5th edition, Pearson.(Units I, II, III, IV, Part of Unit V)

2. Computer System Architecture, M.Morris Mano, 3rd edition, Pearson.(Part of Unit V)

REFERENCE BOOKS:

1. Switching and Finite Automata Theory, Z. Kohavi, Tata McGraw Hill.

2. Stalling, Williams. Computer Organization and Architecture, 7th Edition,2010

2. Fundamentals of Logic Design, C. H. Roth, L. L. Kinney, 7th edition, Cengage Learning.

3. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M.

WEB SOURCES:

1. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/
2. **www.w3schools.com**

24PBCA11 PROBLEM SOLVING TECHNIQUES USING C LAB

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

- To impart foundational knowledge of C programming that enables students to write, compile, and debug basic C programs..
- To develop logical and algorithmic thinking through implementation of common mathematical, string, and file operations.
- To enhance problem-solving skills using structured programming approaches, including functions, control structures, arrays, pointers, and structures.

LIST OF PROGRAMS:

1) Write a C program to find sum and average of three numbers.
2) Write a C program to find the sum of individual digits of a given positive integer.
3) Write a C program to generate the first n terms of the Fibonacci sequence.
4) Write a C program to generate prime numbers between 1 to n.
5) Write a C program to Check whether given number is Armstrong Number or Not.
6) Write a C program to evaluate algebraic expression (ax+b)/(ax-b).
7) Write a C program to check whether given number is perfect number or Not.
8) Write a C program to check whether given number is strong number or not.
9) Write a C program to find the roots of a quadratic equation.
10) Write a C program perform arithmetic operations using switch statement.
11) Write a C program to perform addition and Multiplication of two matrices.
12) Write a C program using user defined functions to determine whether the given string is palindrome or not.
13) Write a C program to count the number of lines, words and characters in a given text.
14) Write a C program to find the length of the string using Pointer.
15) Write a C Program to Calculate Total and Percentage marks of a student using structure.
16) Write a C program to copy the contents of one file to another.

Total Hours : 30

COURSE OUTCOMES:

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

CO1: Understand the syntax, semantics, and structure of C programming language.

CO2: Apply conditional, looping, and branching constructs to solve computational problems such as prime checking, Fibonacci generation, etc.

CO3: Analyze problems and develop modular programs using functions, pointers, and structures.

CO4: **Design** and implement C programs to solve real-world problems using arrays, strings, files, and user-defined functions.

CO5: Evaluate the performance and correctness of various algorithms implemented in C for arithmetic, logic, and data processing tasks.

TEXT BOOKS:

1. **Ray Dowson ,"Programming in ANSI C", 3rd Edition ,** Loughborough UniversityInstitutional Repository , ISBN 1-874152-10-1
2. **E. Balaguruswamy, "Programming in ANSI C"**, 8th Edition, 2019, McGraw HillEducation, ISBN: 978-93-5316-513-0

REFERENCE BOOKS:

1. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford UniversityPress, ISBN: 978-01-9949-147-6.
3. Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2ndEdition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
4. Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978-93-8728-449-4.
5. Jacqueline A Jones and Keith Harrow, "Problem Solving with C", PearsonEducation. ISBN: 978-93-325-3800-9.
6. Dr. Guruprasad Nagraj, "C Programming for Problem Solving", HimalayaPublishing House. ISBN-978-93-5299-361

WEB SOURCES:

1. www.w3schools.com
2. www.tutorialspoint.com
3. www.javapoint.com
4. www.geeksforgeeks.org

24PBCA12 **DATA STRUCTRES LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

- To introduce fundamental data structures such as arrays, stacks, queues, linked lists, trees, and heaps for efficient data manipulation.
- To develop the ability to implement searching, sorting, and traversal algorithms in C with optimal time and space complexity.
- To enhance the understanding of non-linear data structures and their applications through coding and analysis of expressions, trees, and recursion.

1. Given {2,8,3,7,1,4,6,9,0,5} find the location of 9using Linear search and also display its first occurrence.
2. Given {2,8,3,7,1,4,6,9,0,5} find the location of 9 using Binary search and also display its first occurrence.
3. Write a program to push 5,12,34,78,20,11,15,2 into stack and pop 3 times from the stack, also display the popped numbers.
4. Write a program to insert the elements {61,16,8,27} into linear queue and delete three elements from the list. Display your list after each insertion and deletion.
5. Perform the Insertion and Selection Sort on the input {92,7,1,16,48,7,3,0}.
6. Perform Bubble sort for the elements 5,3,1,6,0,2,4.
7. Write a program to insert the elements {61,16,8,27} into singly linked list and delete 8,61,27 from the list. Display your list after each insertion and deletion.
8. Write a program to evaluate a postfix expression 5 3+8 2 - *.
9. Write a program to create binary search tree with the elements {2,5,1,3,9,0,6} and perform inorder, preorder and post order traversal.
10. Write a program to Sort the following elements using heap sort {9.16,32,8,4,1,5,8,0} Quick Sort.

Total Hours : 30

COURSE OUTCOMES:

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

CO1: Understand the concepts of various data structures (arrays, stacks, queues, trees, etc.) and their real-time applications.

CO2: Apply algorithms like linear/binary search, stack/queue operations, and sorting techniques to solve structured problems in C.

CO3: Analyze the performance and behavior of sorting and searching algorithms based on time and space complexity.

CO4: Design and implement dynamic data structures such as linked lists, trees, and stacks to solve complex problems.

CO5: Evaluate postfix expressions, recursive structures, and traversal outputs for correctness and efficiency.

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2 nd Edition, (2000) E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education(1996)
3. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning.

SEMESTER II

L	T	P	O	C
2	0	0	2	2

பாடக் குறியீட்டு எண்: 24LTAM21

பருவம்-2, தமிழ்மமாழிப்பாடம்-2, பகுதி-1, தகுதிப்புள்ளி: 2, வாரப் பாட நேரம்: 2.

தாள்-2

காப்பியம், பக்தி இலக்கியம், கதலகள், நாமாாமகரிகம்-பண்மபாடு

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய ோாாட்டத்தத நமம்படுத்Fதல், அற இலக்கியங்கள், சிற்றிலக்கியம், சிறுகதத ஆகியவற்றற அறிமுகப்படுத்Fதல், தற்காலப் நபச்சுத் தமிழ் எழுத்Fத்தமிழ் ஆகியவற்றின் வளர்ோாிதலகதள மாணவர்கதள அறியச் மசய்தல், அதன்வழி சிந்ததன வளத்ததப் மபருகச் மசய்தல் என்பனவும் நமற்கண்டவழி மாணவர்கதள ஆளுதம மிக்கவர்களாக உருவாக்கி, நபாட்டித்நதர்வுகளுக்குத் தயார் மசய்F அவர்களின் மமாழித் திறதன நமம்படுத்த அவர்களுக்குக் கடிதம் எழுFம் கதலதயக் கற்றுக்மகாடுத்தல், அணி இலக்கணத்தத அறியச் மசய்தல் என்பன இந்தப் பாடத்திட்டத்தின் முக்கிய ோநாக்கமாகும்.

அலகு 1 மகாப்பியங்கள் **8மணி நேரம்**

சிலப்பதிமகாரம்- கமனாத்திறம் உகரத்தக் மகாகத முழுவFம்.

மணிநமககல- மலர்வனம் புக்க காதத முழுவFம்.

கம்பமராமமாயணம் - குகப் படலம் (நதர்ந்மதடுக்கப்பட்ட ஒன்பF மபாடல்கள்)

அலகு 2: பக்தி இலக்கியம் **8 மணி நேரம்**

1. மாணிக்கவாசகர் - திருவாசகம் – மூன்று பாடல்கள்
   - ✓ புல்லாகி பூடாகி (சிவபுராணம்)
   - ✓ எல்லாப் பிறப்பும் (சிவபுராணம்)
   - ✓ உற்றாதர யான் நவண்நடன் (திருப்புலம்பல்)
2. ஆண்டாள் - திருப்பாதவ – மூன்று பாடல்கள் (1, 3, 4)
   - ✓ மார்கழித் திங்கள் ... (பாசுரம் 1)
   - ✓ ஓங்கி உலகளந்த... (பாசுரம் 3)
   - ✓ ஆழிமதழக் கண்ணா... (பாசுரம் 4)
3. வீரமாமுனிவர் - நதம்பாவணி – வளன் மசனித்தப் படலம்
4. சீறாப்புராணம்- மாFக்கு பிணண நின்ற படலம்

அலகு 3 கலலகள் **07 மணி நேரம்**

சிற்பம் - ஓவியம் - இகச - கூத்F - ஒப்பகன - ஆகட அணிகலன்கள்.

அலகு 4 நாமாாமகரிகம், பண்மபாடு **7மணி நேரம்**

மமசாற்மமபாருள் விளக்கம் - பண்கடத் தமிழர் மவாழ்வியல் - அகம் - களவு - கற்பு - குடும்பம் - விருந்நமதாம்பல் - உறவு முகறகள் - சடங்குகள் - ோம்பிக்ககள் - மமபாழFநமபாக்கு - புறம் - நமபார் முகறகள் - ோடுகல் வழிமபாடு - மமகாகடப்பண்பு.

மமாத்தம்: 30 மணி நேரம்

பார்தவ நூல்கள்

1. **தமிழர் நாாகரிகமும் பண்பாடும்,** டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திதணப் பதிப்பகம், 2001.
2. **தவறின்றித் தமிழ் எழFேவாம்**, மா. ோன்னன், ஏகம் பதிப்பகம், 1999.
3. **தவறின்றித் தமிழ் எழுத** - மருதூர் அரங்கராசன், ஐந்திதணப் பதிப்பகம், 2003.
4. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., புF தில்லி : சாகித்திய அக்காமதமி, 2002.
5. **புதிய தமிழ் இலக்கிய வரலாறு**, ோ ால. பத்ேமாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாமடமி, 2007.
6. **மசம்மமாழி தமிழின் சிறப்பியல்புகள்** - முதனவர் மதறமதல இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
7. **பாடநூல் ேதடலுக்கான இதணயம் -** https://archive.org/

L	T	P	O	C
2	0	0	2	2

24LHIN21 HINDI II
Prose, Official Letter Writing & Functional Hindi

COURSE OBJECTIVES :

- To train students in translation
- To develop reading & writing skills
- To create interest towards reading different types of literature
- To understand the value of Senior citizen
- To understand the importance of hard work
- To understand the patriotism and women empowerment
- To introduce the usage of Inscript keyboard

UNIT I: 'Boodee kaki" (Kahani) by Munshi Premchand **6**

UNIT II: 'Puraskar' (Kahani) by Prasad **6**

UNIT III: 'Main Narak Se Bhol Raha Hun' (Vyangy) by Harishankar Parsayi, **6**

UNIT IV: Functional Hindi- Technical & Designation & Department Names-50., Bhav Ek Bhasha Anek **6**

UNIT V : Functional Hindi-Letter Writing- 3 Official Letters.Inscript Keyboard Knowledge. **6**

Total Hours: 30

COURSE OUTCOMES:

At the end of this course Students will be able to

CO1 Know to the value senior citizen , their love and affection towards the family members

CO2 Know the importance of patriotism and women empowerment in the society

CO3 Know the value of hardwork in human life

CO4 Gain fair knowledge of Functional Hindi and fluency in speaking Hindi

CO5 Equip themselves in writing official letters in Hindi importance of translation of technical words and equip knowledge in using inscript keyboard thereby improving their Employability

TEXT/REFERENCE BOOK/WSOURCES:

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	2	2

COURSE OBJECTIVES:

The lessons are being chosen:

- To express his / her where abouts and to ask seek direction
- To express obligation and restriction
- To describe a place
- To narrate and to question To describe someone
- To express his desire and to speak about the future

UNIT I C'est où 6

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

UNIT II N'oubliez pas 6

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

UNIT III: Belle vue sur la mer -- 6

Les adjectifs démonstratifs, Y- pronom complément.

UNIT IV: Quel beau voyage! 6

Les verbes pronominaux, En- pronom complément.

UNIT V: Oh ! joli 6

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

Total Hours: 30 Hrs

COURSE OUTCOMES:

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

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 /REFERENCE BOOKS :

- Prescribed book: LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau
- Reference book: SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

24LENG21 **ENGLISH – II**

L	T	P	O	C
2	0	0	2	2

COURSE OBJECTIVES:

CO1: To read and understand different typ es of prose, poetry, and fiction.
CO2: To think critically about texts and express ideas clearly.
CO3: To recognize and discuss key themes and styles in literary works.
CO4: To learn and use grammar rules correctly in writing and speaking.
CO5: To write more effectively by applying grammar and literary techniques.

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 Hours:30

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 selection

REFERENCE BOOKS:

- Dr. M. Narayana Rao and Dr. B. G. Barki–Anu's Current English for Communication (AnuChitra). June 2012.
- General English for competitive examinations by V.Rajagopalan (Mcgraw Hill Education) -2010.

1. General English for competitive examinations by V.Rajagopalan (Mcgraw Hill Education) -2010.

24SBCA21 OBJECT ORIENTED PROGRAMMING USING C++

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To introduce the fundamental concepts of Object-Oriented Programming (OOP) and C++ syntax and structure.
- To enable students to develop C++ programs using classes, objects, constructors, destructors, inheritance, pointers, and polymorphism.
- To provide knowledge on advanced features like file handling, templates, exception handling, and string operations in C++.

UNIT I INTRODUCTION 9

Introduction to C++ - key concepts of Object-Oriented Programming –Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures : - Decision Making and Statements : If ..else, jump, goto, break, continue, Switch case statements - Loops in C++ : for, while, do - functions in C++ - inline functions – Function Overloading.

UNIT II CLASSES & OBJECTS 9

Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes – Constructor and destructors with static members.

UNIT III INHERITANCE 9

Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchical, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.

UNIT IV POINTERS 9

Pointers – Declaration – Pointer to Class, Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models new and delete operators – dynamicobject – Binding, Polymorphism and Virtual Functions.

UNIT V FILES **9**

Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous function

Total Hours: 45

COURSE OUTCOMES:

On Completion of this course, the students can able to

CO1: Understand the core concepts of Object-Oriented Programming and apply them using C++ features such as classes, objects, and control structures.

CO2: Implement object-oriented principles such as function overloading, constructors, destructors, and static members to develop modular programs.

CO3:. Analyze and apply different types of inheritance, operator overloading, and polymorphism in object-oriented design.

CO4: Demonstrate the usage of pointers, dynamic memory allocation, and virtual functions for efficient program execution.

CO5: Design and develop applications using file handling, templates, exception handling, and string manipulation techniques in C++.

TEXT BOOKS:

1. E.BalaGurusamy "Object Oriented Programming with C++", Tata MC Graw Hill Education.
2. YashwantKanetkar-"Let Us C++", 2nd edition,McGraw HillEducation,2000.

REFERENCE BOOKS:

1. Herbert Schildt "The Complete Reference C++", 4th edition,McGraw Hill Education,2017
2. D.Ravichandran-"Oriented Programming with C++", 2nd edition, TMH.

WEBSOURCES:

1. www.w3schools.com
2. www.tutorialspoint.com
3. www.javapoint.com
4. www.geeksforgeeks.org

5. https://www.tutorialspoint.com/cplusplus/cpp_tutorial.pdf

6. https://www.cplusplus.com/files/tutorial.pdf

7. https://www.slideshare.net/aloknie/oop-cclassfinalppt
8. https://www.slideshare.net/adisesha12/basic-concept-of-oops
9. https://www.slideserve.com/joan-craft/object-oriented-programming-



24CBCA21 **OPEN SOURCE TECHNOLOGIES**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To explore open-source software licenses, open-source project structure.
- To analyse model requirements and constraints for the purpose of designing and implementing software systems using open-source tools.
- To provide an exposure to develop various real time applications using Perl and Python

UNIT I INTRODUCTION 9

Introduction – Why Open Source – Open Source –Principles, Standards Requirements - Successes – Free Software – FOSS – Internet Application Projects.

UNIT II LINUX ENVIRONMENT 9

What is Linux and Open Source? -Linux Distributions and Installation- Getting Familiar with the Linux Command Line-Basic File Operations in Linux-User and Group Management in Linux.

UNIT III PERL 9

Introduction- Syntax Overview- Data Types- Variables- Array- If-Else-Loops-Operators-Functions -File I/O.

UNIT IV PHP 9

PHP – variables, operations- constants- control structures arrays- functions- classes – handling files. E-mailing with PHP – sending an email – multipart message – storing images– getting confirmation- Session tracking using PHP-cookies.

UNIT V MYSQL 9

Introduction – Setting up account –Starting, terminating and writing your own SQL programs - Record selection Technology-Working with strings- –Date and Time – Sorting Query Results – Generating Summary – Working with metadata – Using sequences –MySQL and Web

Total Hours: 45

COURSE OUTCOMES:

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

CO1: Be familiar with fundamentals of Linux operating system.

CO2: To learn the concepts of files and file organization.

CO3: To learn the mechanisms involved in ownership of files and file attributes

CO4. To gain the knowledge on vi editor and regular expressions

CO5. To know the techniques of shell programming**.**

TEXT BOOK:

1. Kailash Vadera, Bhavyesh Gandhi, "Open-Source Technology", Laxmi Publications Pvt Ltd2012, 1st Edition.

REFERENCE BOOK:

1. Fadi P. Deek and James A. M. McHugh, "Open Source: Technology and Policy",Cambridge Universities Press 2007.

WEB SOURCES:

1. https://tavaana.org/sites/default/files/introduction_to_opensource.pdf
2. http://www.gov.pe.ca/photos/original/IPEI_ebiz_oss.pdf
3. https://www.tutorialspoint.com/php/php_tutorial.pdf
4. https://www.tutorialspoint.com/mysql/mysql_tutorial.pdf

L	T	P	O	C
0	0	3	1	1

24PBCA22 OBJECT ORIENTEDPROGRAMMING LAB USING C++

COURSE OBJECTIVES:

- To develop a foundational understanding of C++ programming concepts, including control structures, functions, and object-oriented features.
- To equip students with the ability to apply object-oriented programming principles such as inheritance, polymorphism, operator overloading, and encapsulation.
- To train students in advanced C++ features like file handling, exception handling, virtual functions, and the use of constructors and destructors through hands-on programming tasks.

LIST OF EXPERIMENTS:

1. Write a C++ program to demonstrate Control Structures
2. Write a C++ program to calculate Simple interest using class and Object
3. Write a C++ program to sort given numbers in Ascending Order using Bubble sort
4. Write a C++ program to manipulate a given string
5. Write a C++ program to demonstrate function overloading
6. Write a C++ program to demonstrate Inline and friend function
7. Write a C++ program to demonstrate Swap using call-by-value
8. Write a C++ program to demonstrate Mathematical functions
9. Write a C++ program to demonstrate Constructor and Destructor
10. Write a C++ program to demonstrate Operator Overloading
11. Write a C++ program to demonstrate Single Inheritance
12. Write a C++ program to demonstrate Multi level Inheritance
13. Write a C++ program to demonstrate Multiple Inheritance
14. Write a C++ program to demonstrate virtual function
15. Write a C++ program to demonstrate Exception handling

Total Hours: 30

COURSE OUTCOMES:

On Completion of this course, the students can able to

CO1: Develop C++ programs using control structures, arrays, and functions to solve real-world problems.

CO2: Apply object-oriented concepts such as classes, objects, constructors, and destructors to design modular and reusable code.

CO3: Implement operator overloading and inheritance to build extensible and maintainable applications.

CO4: Utilize advanced features like virtual functions, friend functions, and polymorphism in developing dynamic applications.

CO5: Demonstrate proficiency in handling exceptions and manipulating files and strings in C++ to build robust applications.

TEXT BOOKS:

1) E.BalaGurusamy "Object Oriented Programming with C++", Tata MC Graw Hill Education.
2) YashwantKanetkar-"Let Us C++", 2nd edition,McGraw HillEducation,2000.

REFERENCE BOOKS:

1. Herbert Schildt "The Complete Reference C++", 4th edition,McGraw Hill Education,2017
2. D.Ravichandran-"Oriented Programming with C++", 2nd edition, TMH.

WEBSITES

1. www.w3schools.com
2. www.tutorialspoint.com
3. www.javapoint.com
4. www.geeksforgeeks.org

WEB SOURCES

1. https://www.tutorialspoint.com/cplusplus/cpp_tutorial.pdf
2. https://www.cplusplus.com/files/tutorial.pdf
3. https://www.slideshare.net/aloknie/oop-cclassfinalppt
4. https://www.slideshare.net/adisesha12/basic-concept-of-oops
5. https://www.slideserve.com/joan-craft/object-oriented-programming-with-c

24PBCA21 **OPEN SOURCE TECHNOLOGIES LAB**

L	T	P	O	C
0	0	3	1	1

COURSE OBJECTIVES:

- To introduce students to shell scripting and its applications in automating system tasks.
- To develop foundational knowledge in working with databases using MySQL and integrating them with web technologies.
- To equip students with the skills required to build interactive web applications using PHP and perform backend operations.

LIST OF PROGRAMS

1. Write a Shell script that accepts a filename, starting and ending line numbers as arguments and displays all the lines between the given line numbers?
2. Write a Shell script to list all of the directory files in a directory.
3. Write a Shell script to find factorial of a given integer?
4. Write a awk script to find the number of characters, words and lines in a file?
5. Installation Apache
6. Creating TABLE using My SQL.
7. Data Manipulation Commands
8. Joining Database Tables
9. Palindrome or not in PHP
10. Connect PHP with My SQL
11. Create Login page with help of PHP and My SQL

Total Hours: 30

COURSE OUTCOMES:

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

CO1: Write and execute shell scripts to automate system-level operations such as file processing, factorial calculation, and directory handling.

CO2: Analyze and manipulate text and data files using awk scripting for operations like counting lines, words, and characters.

CO3: Perform MySQL operations such as table creation, data manipulation, and database joining effectively.

CO4: Develop and deploy basic PHP programs to perform logic-based operations (e.g., palindrome checking) and connect with databases.

CO5: Design and implement interactive web applications like login systems using PHP and MySQL integration.

TEXT BOOKS:

1. James Lee and Brent Ware ,"Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", , Dorling Kindersley(India) Pvt. Ltd, 2008.

REFERENCE BOOKS:

1. Eric Rosebrock, Eric Filson ,"Setting Up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons, 2004.

WEBSITES

1. www.w3schools.com
2. www.tutorialspoint.com
3. www.javapoint.com
4. www.geeksforgeeks.org

WEB SOURCES:

1. https://tavaana.org/sites/default/files/introduction_to_opensource.pdf
2. http://www.gov.pe.ca/photos/original/IPEI_ebiz_oss.pdf
3. https://www.tutorialspoint.com/php/php_tutorial.pdf
4. https://www.tutorialspoint.com/mysql/mysql_tutorial.pdf

24SBCA22 **COMPUTER GRAPHICS AND MULTIMEDIA**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

- To provide foundational knowledge of computer graphics principles, graphical devices, and basic graphics programming using C.
- To introduce students to 2D and 3D transformations, viewing techniques, clipping, and surface detection methods used in graphics systems and virtual reality.
- To equip students with the theoretical and practical understanding of multimedia systems, their communication protocols, and application development processes.

UNIT I BASIC CONCEPTS 12

Introduction, Definition of Computer Graphics, Area of Computer Graphics, Design and Drawing, GRAPHIC DEVICES- Cathode Ray Tube, Quality of Phosphors, CRTs for Color Display, Beam PenetrationCRT, The Shadow - Mask CRT, Direct View Storage Tube, Tablets, The light Pen, C Graphics Basics Graphics programming, initializing the graphics, C Graphical functions, simple programs.

UNIT II 3D GRAPHICS 12

2D Transformations – Clipping – Window – View Prot Mapping – Graphical User Interfaces and Interactive Input Methods – Picture Construction Techniques – Virtual Reality Environment.3D Transformation – 3D Viewing – Visible Surface Detection – Back Face Detection – Depth Buffer Method – Scan Line Method.

UNIT III MULTIMEDIA BASICS 12

Introduction to Multimedia – Components – Hypermedia – Authoring – Authoring tools – File formats – Color models – Digital Audio representation – Transmission – Audio signal processing – Digital music making – MIDI – Digital video – Video compression techniques – Video performance measurements – Multimedia Databases – Animation – Key frames and twining techniques – Principles of animation – Virtual

reality – Multimedia for portable devices.

UNIT IV MULTIMEDIA COMMUNICATION **12**

Stream characteristics for Continuous media – Temporal Relationship – Object Stream Interactions -Media Synchronization – Models for Temporal Specifications – Streaming of Audio and Video –Recovering from packet loss – RTSP — Multimedia Communication Standards –RTP/RTCP – SIP and H.263- Real time streaming and On-demand streaming.

UNIT V MULTIMEDIA APPLICATION DEVELOPMENT **12**

Design, Development and evaluation of multimedia a system - The development of user interface design - Design Process - Multimedia & the Internet - Multimedia conferencing - Multimedia file sharing – Multimedia broadcasting - Multimedia Development Issues - Multimedia project – Structured Multimedia development - Multimedia project timing - Sample project.

Total Hours: 60

COURSE OUTCOMES

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

CO1: Describe and implement fundamental concepts of computer graphics, graphical devices, and graphics programming in C.

CO2: Apply 2D and 3D transformation techniques, perform clipping, viewing, and surface detection for graphical applications.

CO3: Analyze various components and formats used in multimedia systems including audio, video, animation, and virtual reality.

CO4: Understand and evaluate multimedia communication standards, streaming protocols, and synchronization models.

CO5: Design and develop multimedia applications considering UI/UX principles, internet integration, and structured development processes.

TEXT BOOKS:

1. Donald Hearn and Pauline Baker M, ―Computer Graphics", Prentice Hall, New Delhi, 2007 [UNIT I – III]

2. Andleigh, P. Kand KiranThakrar, ―Multimedia Systems and Design‖, PHI, 2003. [UNIT IV,V]

REFERENCES:

1. Donald Hearn and M. Pauline Baker, “Computer Graphics in C Version”, Second Edition, PearsonEducation

2. Tom McReynolds – David Blythe " Advanced Graphics Programming Using OpenGL" , Elsevier,2010
3. Parag Havaldar and Gerard Medioni, "Multimedia Systems-Algorithms, Standards and Industry Practices", Course Technology, Cengage Learning, 2010.John F. Koegel Bufend , "Multimedia systems", Pearson Education, Delhi, 2002
4. Ralf Steinmetz and Klara "Multimedia Computing, Communications and Applications", Pearson Education,2004.
5. Kurose and Ross, 'Computer Networks : A top down Approach', Pearson Education, 2002
6. Mohammad Dastbaz, Desgning Interactive Multimedia Systems
7. Multimedia – Technology and applications David Hillman Galgotia Publications, Delhi
8. Ralf Steinmetz and Klara Nahrstedt "Multimedia Applications", Springer, 2007.

SEMESTER III

24CBCA31 **PROGRAMMING IN JAVA**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVE

- To introduce the principles of Object-Oriented Programming (OOP) and familiarize students with Java's evolution, structure, and environment.
- To enable students to develop Java programs using classes, objects, methods, control structures, arrays, and inheritance.
- To provide knowledge on advanced Java features such as packages, exception handling, and user-defined classes for building robust applications.

UNIT I: FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING 9

Basic Concepts of Object Oriented Programming (OOP), Benefits and Applications of OOP. **Java Evolution:** Java Features, Difference between Java, C and C++, Java and Internet, Java Environment. **Overview of Java Language:** Introduction to Simple Java Program, Use of Comments and Math function, Application of two classes, Java Program Structure, Java Tokens and statements, Implementing Java program and JVM, Command Line Arguments.

UNIT II: CONSTANTS, VARIABLES AND DATA TYPES 9

Constants, Variables, Data Types, Declaration of Variables, Giving values to Variables, Symbolic Constants, Typecasting. **Operators & Expressions:** Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment & Decrement operators, conditional operators, Bitwise operators, Arithmetic Expressions, Evaluation of Expressions, Type Conversions in Expressions, Operator Precedence & Associativity. **Decision Making, Branching & Looping:** Decision Making with Control Statements, Looping statements, Jump in loops, Labelled loops.

UNIT III: CLASSES, OBJECTS AND METHODS 9

Defining Class, Methods Declaration, Constructors, Methods Overloading, Overriding Methods, Inheritance**. Arrays, Strings and Vectors:** 1D arrays, Creating an Array, 2D arrays, Strings, Vectors, Wrapper Classes, Enumerated Types**. Inheritance:** Defining, extending classes, and Implementing Interfaces. Multiple inheritance and polymorphism.

UNIT IV: PACKAGES 9

Basics of packages, System packages, Creating and accessing packages, creating user defined packages, Adding class to a package.

UNIT V: EXCEPTION HANDLING 9

Using the main keywords of exception handling: try, catch, throw, throws and finally; Nested try, multiple catch statements, creating user defined exceptions**.**

Total Hours: 45

COURSE OUTCOMES:

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

CO1: Understand the fundamentals of Object-Oriented Programming and distinguish Java from other languages like C and C++.

CO2: Apply decision-making, branching, and looping concepts using Java control structures and operators.

CO3: Develop Java applications using classes, objects, constructors, arrays, strings, and implement polymorphism and inheritance.

CO4: Create and manage user-defined packages to organize Java programs efficiently.

CO5: Implement robust applications by handling exceptions and defining custom exception classes in Java.

TEXT BOOKS:

1. Balaguruswamy E. (2023). Programming with JAVA: A Primer. 7th edition. India: McGraw Hill Education
2. Schildt, H. (2022). Java: The Complete Reference. 12th edition.McGraw-Hill Education.

REFERENCE BOOKS:

1. Arunesh Goyal, The Essentials of JAVA, Khanna Book Publishing Company Private Limited, 2012.
2. Tanweer Alam, Core JAVA, Khanna Book Publishing Company Private Limited, 2015.
3. Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson,2008.
4. S. Malhotra and S. Choudhary, Programming in Java, 2nd Edition, OxfordUniversity Press, 2014.
5. Learning Java, 6th Edition By Marc Loy, Patrick Niemeyer and Daniel Leuck O'Reilly Media, Inc.August 2023

WEB RESOURCES

1. https://www.w3schools.com/java/.
2. http://www.java2s.com/.
3. https://onlinecourses.nptel.ac.in/noc22_cs47/pre

24CBCA32 **DATA BASE MANAGEMENT SYSTEM**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To introduce the foundational concepts of databases, DBMS, data models, and relational schema design.
- To provide practical knowledge of SQL, relational algebra, normalization, transaction management, and data indexing.
- To explore modern database technologies such as NoSQL, Big Data, advanced SQL queries, and ensure understanding of database security and warehousing.

UNIT I: INTRODUCTION TO DATABASES 9

Definition of Data, Database, and DBMS, Overview of Database Applications, Advantages and Disadvantages of DBMS, Roles of Database Users and Administrators**. Data Models:** Introduction to Data Models, Types of Data Models (Hierarchical, Network, Relational, Object-oriented), Importance of Data Models in DBMS**. Database Design**:Keys: Primary Key, Candidate Key, Super Key, Foreign Key, Composite Key, Alternate Key, Unique Key, Surrogate Key,Constraints in a table: Primary Key, Foreign Key, Unique Key, NOT NULL, CHECK, Entity-Relationship (ER) Model,Entities and Entity Sets, Attributes and Relationships,ER Diagrams,Key Constraints and Weak Entity Sets, Extended ER Features,Introduction to the Relational Model and Relational Schema.

UNIT II: RELATIONAL ALGEBRA AND CALCULUS 9

Introduction to Relational Algebra, Operations: Selection, Projection, Set Operations, Join Operations, Division,Tuple and Domain Relational Calculus. **Structured Query Language (SQL):** SQL Basics: DDL and DML, Aggregate Functions (Min(), Max(), Sum(), Avg(), Count()), Logical operators (AND, OR, NOT), Predicates (Like, Between, Alias, Distinct), Clauses(Group By, Having, Order by, top/limit), Inner Join, Natural Join, Full Outer Join, Left Outer Join, Right outer Join, Equi Join. **Normalization and Database Design**: Functional Dependencies: Armstrong's Axioms, Definition, Properties (Reflexivity, Augmentation, Transitivity), Types (Trivial, Non-Trivial, Partial and Full Functional Dependency), Closure of Functional Dependencies, Normal Forms (1NF, 2NF, 3NF, BCNF), Denormalization.

UNIT III: TRANSACTION MANAGEMENT 9

ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions, Lock-Based Concurrency Control, Performance of Locking, Transaction Support in SQL,Introduction to Crash Recovery, 2PL, Serializability, and Recoverability, Introduction to Lock Management, Dealing with Deadlocks. **Database Storage and Indexing**: Data on External Storage, File Organizations and Indexing, Index Data Structures, Comparison of File Organizations, Indexes and Performance Tuning, Guidelines for Index Selection, Basic Examples of Index Selection.

UNIT IV: NOSQL DATABASES AND BIG DATA 9

Introduction to NoSQL, Data Models: Document, Key value, Column family, Graph. Uses and Features of NO/SQL document databases. CAP theorem, BASE vs ACID, CRUD operations, MongoDB operators, Overview of Big Data Technologies: Hadoop, MongoDB, and Cassandra.

UNIT V: ADVANCED SQL 9

Analytical queries, Hierarchical queries, Recursive queries, Views, Cursors, Stored Procedures and Functions, Packages, Triggers, Dynamic SQL. **Database Security and Advanced Topics:** Introduction to Database Security, Access Control, Discretionary Access Control, Introduction to Data Warehousing, OLAP, And Data Mining.

Total Hours: 45

COURSE OUTCOMES:

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

- CO1: Explain the concepts of databases, DBMS architecture, data models, and ER modeling for effective database design

.

- CO2: Apply relational algebra, calculus, and SQL commands to retrieve, manipulate, and query data efficiently.
- CO3: Analyze transaction processing, concurrency control, and recovery techniques to ensure consistency and reliability in databases.
- CO4: Compare traditional relational databases with NoSQL systems and demonstrate CRUD operations using MongoDB and other NoSQL tools.
- CO5: Create advanced SQL queries, stored procedures, triggers, and ensure secure access through proper database authorization techniques.

TEXT BOOKS

1. Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, third edition, McGraw – Hill, 2018

2. Benjamin Rosenzweig, Elena Rakhimov, “Oracle PL/SQL by Example”, fifth edition, Prentice Hall, 2015

3. Brad Dayley, “NoSQL with MongoDB in 24 Hours”, 1st edition, Sams Publishing, 2024

REFERENCE BOOKS

1. Korth, Silbertz, Sudarshan,” Database System Concepts”, Seventh Edition, McGraw - Hill.(2019).

2. R.P. Mahapatra, Govind Verma, “Database Management Systems”, Khanna Publishing House, 2024.

WEB RESOURCES

1. https://oracle-base.com/articles
2. https://forums.oracle.com/ords/apexds/domain/dev- community/category/sql_and_pl_sql
3. https://asktom.oracle.com/ords/f?p=

24PBCA31 **PROGRAMMING IN JAVA LAB**

L	T	P	O	C
0	0	4	1	2

COURSE OBJECTIVES:

- To introduce students to fundamental Java programming concepts including control structures, data handling, and object-oriented programming.
- To provide hands-on experience in applying Java features such as inheritance, polymorphism, packages, and exception handling through practical programs.
- To enable students to build real-time applications by implementing reusable Java code with strong logical and problem-solving capabilities.

LIST OF EXPERIMENTS:

1. Write a program to send the name and surname of a student through command line arguments and print a welcome message for the student.
2. Write a java program to find the largest number out of n natural numbers.
3. Write a java program to find the Fibonacci series & Factorial of a number using recursive and non-recursive functions.
4. Write a Java program to perform mathematical Operations
5. Write a Java program that displays the number of characters, lines and wordsin a text.
6. Write a Java program to create a class called Shape with methods called getPerimeter() and getArea(). Create a subclass called Circle that overrides the getPerimeter() and getArea() methods to calculate the area and perimeter of a circle.
7. Write a Java program to create a class Employee with a method called calculateSalary(). Create two subclasses Manager and Programmer. In each subclass, override the calculateSalary() method to calculate and return the salary based on their specific roles.
8. Write a Java package program for the class book and then import the data from the package and display the result.
9. Write a Java program for finding the cube of a number using a package for various data types and then import it in another class and display the results.

10. Write a Java program that reads a list of integers from the user and throws an exception if any numbers are duplicates.

Total Hours: 30

COURSE OUTCOMES:

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

CO1: Develop Java programs using command-line arguments, loops, functions, and control structures.

CO2: Analyze and solve problems related to text processing and mathematical operations using Java methods.

CO3: Apply object-oriented programming concepts like inheritance, overriding, and abstraction using Java classes.

CO4: Demonstrate the use of Java packages by designing and importing reusable code modules across applications.

CO5: Implement robust exception handling in Java to manage program errors and ensure secure coding practices.

TEXT BOOKS:

1. Balaguruswamy E. (2023). Programming with JAVA: A Primer. 7th edition. India: McGraw Hill Education
2. Schildt, H. (2022). Java: The Complete Reference. 12th edition.McGraw-Hill Education.

REFERENCE BOOKS:

1. Arunesh Goyal, The Essentials of JAVA, Khanna Book Publishing Company Private Limited, 2012.
2. Tanweer Alam, Core JAVA, Khanna Book Publishing Company Private Limited, 2015.
3. Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson,2008.
4. S. Malhotra and S. Choudhary, Programming in Java, 2nd Edition, OxfordUniversity Press, 2014.

WEB RESOURCES:

1. https://www.w3schools.com/java/.
2. http://www.java2s.com/.
3. https://onlinecourses.nptel.ac.in/noc22_cs47/pre

L	T	P	O	C
0	0	4	1	2

24PBCA32 RELATIONAL DATA BASE MANAGEMENT SYSTEM LAB

COURSE OBJECTIVES:

1. To introduce fundamental SQL concepts for defining and manipulating database structures using DDL and DML commands.
2. To provide practical knowledge on applying constraints, performing queries, and maintaining data integrity.
3. To enable students to use aggregate functions for data analysis and effective retrieval of meaningful insights from databases.

LIST OF EXPERIMENTS:

1. **DDL Commands**

Create the table to;

- ✓ Add a new attribute state in supplier table
- ✓ Remove attribute city from supplier table
- ✓ Modify the data type of phone attribute
- ✓ Change the name of attribute city to address
- ✓ Change a table's name, supplier to sup
- ✓ Use truncate to delete the contents of supplies table
- ✓ Remove the part table from database

2. **DML Commands**

Create the table to;

- ✓ Insert at least 10 records in table's supplier, part and supplies.
- ✓ Show the contents in table's supplier, part and supplies.
- ✓ Find the name and city of all suppliers.
- ✓ Find the name and phone no of all suppliers who stay in 'Delhi'.
- ✓ Find all distinct branches of suppliers.
- ✓ Delete the record of the supplier whose SID is 204001.
- ✓ Delete all records of supplier table.

- ✓ Delete all records of suppliers whose city starts with capital A.
- ✓ Find the supplier names which have 'lk' in any position.
- ✓ Find the supplier name where 'R' is in the second position.
- ✓ Find the name of supplier whose name starts with 'V' and ends with 'A'.
- ✓ Change the city of all suppliers to 'BOMBAY'.
- ✓ Change the city of supplier 'Vandana' to 'Goa'.

3. Queries with Constraints

- ✓ Create the supplier table with Primary Key Constraint.
- ✓ Create supplies table with Foreign key Constraint.
- ✓ Create a part table with UNIQUE Constraint.
- ✓ Create supplier Table with Check Constraints.
- ✓ Create Supplier table with Default Constraint.

4. Aggregate Functions

- ✓ Find the minimum, maximum, average and sum of costs of parts.
- ✓ Count the total number of parts present.
- ✓ Retrieve the average cost of all parts.

Total Hours: 30

COURSE OUTCOMES:

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

- CO1: Apply DDL commands to create, modify, and manage relational database structures.
- CO2: Demonstrate proficiency in using DML commands for data insertion, modification, deletion, and retrieval in relational databases.
- CO3: Implement and enforce integrity constraints such as primary key, foreign key, unique, check, and default during table creation.
- CO4: Analyze datasets using SQL aggregate functions to perform computations such as count, sum, average, max, and min.
- CO5: Design and execute SQL queries using conditional clauses and pattern matching to extract specific data from databases.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

2. Pal Nabendu and Sarkar Sahadeb, Statistics: Concepts and Applications, Second Edition, PHI, 2013

3. Montgomery Douglas and Runger George C., Applied Statistics and Probability for Engineers, Wiley, 2016.

4. Reena Garg, Engineering Mathematics, Khanna Publishing House, 2024.

REFERENCE BOOKS:

1. Korth, Silbertz, Sudarshan," Database System Concepts", Seventh Edition, McGraw - Hill.(2019)

2. R.P. Mahapatra, Govind Verma, "Database Management Systems", Khanna Publishing House, 2025.

WEB LINKS:

1. https://nptel.ac.in/courses/111106112

2. https://nptel.ac.in/courses/111105041

3. https://nptel.ac.in/courses/111105090

4. https://nptel.ac.in/courses/111105041

5. https://onlinecourses.nptel.ac.in/noc21_ma74/preview

WEB SOURCES:

1. https://oracle-base.com/articles
2. https://forums.oracle.com/ords/apexds/domain/devcommunity/category/sql_and_pl_sql
3. https://asktom.oracle.com/ords/f?p=100:1:0

24CBCA33 **PROBABILITY AND STATISTICS**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

CO1: To make the students identify randomness scientifically using theory of probabaility.

CO2: To make students represent the statistical data in a systematic way and analyze it to gain meaningful information.

CO3:To make the students apply statistical and probabilistic concepts in real life situation.

UNIT I: Basic Statistics 09

Basic concepts of Statistics Qualitative and quantitative data, classification of data , construction of frequency distribution, diagrammatic representation of data.

Measures of Central tendency: Mean, Median and Mode

Measure of Dispersion - Range, Mean deviation - Standard Deviation and coefficient of variation.

UNIT II: Correlation and Regression Analysis 09

Correlation: Types of Correlation - Methods of studying correlation - Scatter diagram method, Karl Pearson's Coefficient of correlation, Spearman's Rank Correlation Coefficient.

Regression: Regression Lines and Regression equations - simple problems.

UNIT III: Basic Probability and Standard Distributions 09

Introduction to Probability - Conditional probability - Baye's Theorem - Random Variables-Discrete random variables - Continuous Random Variables - Probability mass function-Probability density function.

Introduction to theoretical distribution - Discrete Distributions - Binomial, Poisson, Geometric Distributions.Continuous Distribution - Uniform, Normal, Exponential and Gamma distribution – Properties.

UNIT IV: Sampling Theory 09

Introduction to small sample – t-test-Single mean, difference of means, and Paired t-test, F-test- Chi square test for goodness of fit and independence of attributes.

TEXT BOOKS:

1. Manish Sharma, Amit Gupta, The Practice of Business Statistics, Khanna Book Publishing Company, 2010 (AICTE Recommended Textbook)

2. Das N. G., Statistical Methods, Combined Edition, Tata McGraw Hill, 2010.

3. Ross Sheldon M., Introduction to Probability and Statistics for Engineers and Scientists, 6th Edition, Elsevier, 2021.

4. Miller Irwin and Miller Marylees, Mathematical Statistics with Applications, Seventh Edition, Pearson Education, 2005

SEMESTER IV

24CBCA41 **PYTHON PROGRAMMING**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

- To introduce the fundamentals of Python programming including syntax, data types, operators, and control structures.
- To enable students to design and implement user-defined functions, modules, and handle exceptions effectively.
- To equip learners with the skills to work with data structures, files, and perform data visualization using libraries like NumPy and matplotlib.
-

UNIT I: INTRODUCTION

History and Application areas 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 Control Flow Statements: Conditional Flow statements; Loop Control Statements; Nested control Flow; continue and break statements, continue, Pass and exit.

UNIT II: FUNCTIONS

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.

UNIT III: MUTABLE AND IMMUTABLE OBJECTS 15

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 IV: EXCEPTION HANDLING 10

Try-except-else-finally block, raise statement, hierarchy of exceptions, adding exceptions. Data visualization: Plotting various 2D and 3D graphics; Histogram; Pi charts; Sine and cosine curves

UNIT V: FILES

Types of Files; Creating, Reading and Writing on Text and Binary Files; The Pickle Module, Reading, Writing CSV Files. Reading and writing of CSV and JSON fileS…….

Types of Module,

Total Hours: 60

COURSE OUTCOMES:

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

CO1: Apply basic Python constructs including variables, data types, operators, and control flow to develop simple programs.

CO2: Design and implement modular code using functions, lambda expressions, and modules.

CO3: Manipulate Python's built-in data structures such as lists, tuples, and dictionaries for problem-solving tasks.

CO4: Handle exceptions effectively and use data visualization techniques to interpret and represent data graphically.

CO5: Read from and write to different file formats including text, binary, CSV, and JSON to manage data persistently.

TEXT BOOKS:

1. Venkatesh, Nagaraju Y, Introduction to Python Programming, Khanna Publishing House, 2021.
2. Jeeva Jose, Introduction to Computing & Problem Solving With PYTHON, Khanna Publishing House, 2023.
3. Sheetal Taneja & Naveen kumar: Python Programming a Modular approach – A Modular approach with Graphics, Database, Mobile and Web applications, Pearson, 2017.

REFERENCE BOOKS:

1. ThinkPython, by Allen Downey, 2 nd edition, 2015, O'Reilly.
2. An introduction to Python for absolute beginners, by Bob Dowling, Cambridge Univ.
3. Introduction to Computation and Programming using Python, by John Guttag, 2 nd edition, 2016, PHI India.

WEB SOURCES:

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

24CBCA42 **ARTIFICIAL INTELLIGENCE**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To introduce the foundational concepts of Artificial Intelligence, intelligent agents, and problem-solving techniques.
- To explore advanced search algorithms, logical reasoning, uncertainty handling, and planning strategies in AI.
- To familiarize students with AI domains such as machine learning, computer vision, NLP, robotics, and analyze the ethical implications of AI applications.

UNIT I: INTRODUCTION TO AI 9

What is AI? Intelligent Agents: Agents and environment, the concept of Rationality, the nature of environment, the structure of Agents. Knowledge-Based Agents: Introduction to Knowledge-Based Agents, The Wumpus World as an Example World. Problem-solving: Problem-solving agents.

UNIT II: ADVANCED SEARCH TECHNIQUES 9

Uninformed Search: DFS, BFS, Iterative Deepening Search. Informed Search: Best First Search, A* search, AO* search. Adversarial Search & Games: Two-player zero-sum games, Minimax Search, Alpha- Beta pruning. Constraints and Constraint Satisfaction Problems (CSPs), Backtracking search for CSP. Evolutionary Search Techniques: Introduction to evolutionary algorithms, Genetic algorithms, Applications of evolutionary search in AI.

UNIT III: LOGICAL REASONING AND UNCERTAINTY 9

Logic: Propositional logic, First-order predicate logic, Propositional versus first-order inference, Unification and lifting. Inference: Forward chaining, Backward chaining, Resolution, Truth maintenance systems.

UNIT IV: INTRODUCTION TO PLANNING 9

Blocks World problem, Strips; Handling Uncertainties: Non-monotonic reasoning, Probabilistic reasoning, Introduction to Fuzzy set theory.

UNIT V: DOMAINS AND APPLICATIONS OF AI 9

Domains in AI: Introduction to Machine Learning, Computer Vision, Robotics, Natural Language Processing, Deep Neural Networks, and their Applications. Expert Systems: The architecture and role of expert systems include two case studies. Legal and Ethical Issues: Concerns related to AI.

Total Hours: 60

COURSE OUTCOMES:

CO1: Understand and apply the principles of intelligent agents and knowledge-based systems in AI environments.

CO2: Implement and analyze various uninformed and informed search techniques, including adversarial and evolutionary algorithms..

CO3: Apply logical reasoning techniques using propositional and first-order logic, and solve problems using inference methods.

CO4: Examine planning methods and deal with uncertainty using probabilistic and fuzzy logic models.

CO5: Explore real-world AI applications in domains like machine learning, computer vision, NLP, and evaluate ethical and legal challenges in AI.

TEXT BOOKS:

1. M.C. Trivedi, A Classical Approach to Artificial Intelligence, Khanna Book Publishing Company, 2024 (AICTE Recommended Textbook).
2. Nilsson Nils J, Artificial Intelligence: A new Synthesis, Morgan Kaufmann Publishers Inc. San Francisco, CA, ISBN: 978-1-55-860467-4.
3. Dan W Patterson, Introduction to Artificial Intelligence & Expert Systems, PHI Learning 2010.
4. Rajiv Chopra, Data Science with Artificial Intelligence, Machine Learning and Deep Learning, Khanna Book Publishing Company, 2024.

REFERENCE BOOKS:

1. M.C. Trivedi, Introduction to AI and Machine Learning, Khanna Book Publishing Company, 2024.
2. Russell, S. and Norvig, P., "Artificial Intelligence - A Modern Approach", 3rd edition, Prentice Hall
3. Van Hirtum, A. & Kolski, C. (2020). Constraint Satisfaction Problems: Algorithms and Applications. Springer
4. Rajiv Chopra, Machine Learning and Machine Intelligence, Khanna Book Publishing Company, 2024.

WEB SOURCES:

1. https://www.javatpoint.com/agents-in-ai
2. https://artificialintelligence.readthedocs.io/en/
3. https://www.geeksforgeeks.org/search-algorithms-in-ai

24CBCA43 **DESIGN AND ANALYSIS OF ALGORITHM**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To analyze performance of algorithms.
- To understand and choose the appropriate algorithm design technique for a specified application.
- To solve problems using algorithm design techniques such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
- To analyze the impact of algorithm design techniques on each application solved.

UNIT I: INTRODUCTION 9

What is an algorithm? Design and performance analysis of algorithms, time complexity, space complexity. Asymptotic notations (O, Ω, Θ) to measure growth of a function and application to measure complexity of algorithms. Analysis of sequential search, bubble sort, selection sort, insertion sort, matrix multiplication. Recursion: Basic concept. Analysis of recursive algorithms, Master's theorem.

UNIT II: THE DIVIDE & CONQUER DESIGN TECHNIQUE 9

The general concept. Binary search, finding the maximum and minimum, merge sort, quick sort. Best and worst case analysis for the mentioned algorithms. Strassen's matrix multiplication. Lower bound for comparison-based sorting.

UNIT III: THE GREEDY DESIGN TECHNIQUE 9

The general concept. Applications to general Knapsack problem, finding minimum weight spanning trees: Prim's and Kruskal's algorithms, Dijkstra's algorithm for finding single source shortest paths problem.

UNIT IV: THE DYNAMIC PROGRAMMING DESIGN TECHNIQUE 9

The general concept. Computation of Fibonacci series and Binomial coefficients, all pair shortest paths problem (Floyd-Warshall's algorithm), 0/1 Knapsack problem. Algorithms on Graphs: Breadth First Search, Depth First Search, finding connected components, depth first search of a directed graph, topological sorting.

UNIT V: LIMITATIONS OF ALGORITHMIC POWER 9

Backtracking Method: n-Queen problem; sum of subsets problem/ Hamiltonian circuit problem/vertex cover problem. Computational Intractability: Overview of non-deterministic algorithms, P, NP, NP-Complete and NP-hard problems.

Total Hours: 45

COURSE OUTCOMES:

CO1: Understand the characteristics of rational agents, and the environment in which they operate, and gain insights about problem-solving agents.

CO2: Gain insights about Uninformed and Heuristic search techniques and apply them to solve search applications.

CO3: Appreciate the concepts of knowledge representation using Propositional logic and Predicate calculus and apply them for inference/reasoning.

CO4: Obtain insights about Planning and handling uncertainty through probabilistic reasoning and fuzzy sets.

CO5: Obtain a basic understanding of the AI domains and their applications and examine the legal and ethical issues of AI

TEXT BOOKS:

1. Gajendra Sharma, Design and Analysis of Algorithms, Khanna Publishing House (AICTE Recommended Textbook)

2. Cormen Thomas H., Leiserson Charles E., Rivest Ronald L. and Stein Clifford, Introduction to Algorithms, PHI publication, 3rd Edition, 2009.

3. Horowitz Ellis, Sahni Sartaj and Rajasekaran Sanguthevar, Fundamentals of Computer Algorithms, University Press (I) Pvt. Ltd., 2012.

4. Levitin Anany, Introduction to Design and Analysis of Algorithms, 3 rd Edition, Pearson, 2012.

REFERENCE BOOKS:

1. Aho Alfred V., Hopcroft John E. & Ullman Jeffrey D., The Design & Analysis of Computer Algorithms, Addison Wesley Publications, Boston, 1983.

2. Kleinberg Jon & Tardos Eva, Algorithm Design, Pearson Education, 2006.

WEB SOURCES:

1. https://nptel.ac.in/courses/106101060

2. https://www.cs.umd.edu/~mount/451/Lects/451lects.pdf

24CBCA44 **COMPUTER NETWORKS**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To provide fundamental knowledge of computer networks, network models, transmission methods, topologies, and networking devices.
- To develop an understanding of core network protocols, data link and transport layers, addressing mechanisms, routing algorithms, and network security.
- To introduce advanced and emerging networking technologies, their applications, and network management tools and techniques.

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, Advantages and Disadvantages of Each Topology. **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.

UNIT II: DATA LINK LAYER AND NETWORKING PROTOCOLS 9

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. **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

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UNIT III: NETWORK LAYER AND TRANSPORT LAYER 9

Network Layer: IP Routing: Static vs. Dynamic Routing,Routing Protocols: RIP, OSPF, BGP, Network Address Translation (NAT). **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.

UNIT V: EMERGING TECHNOLOGIES 9

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 Hours: 45

COURSE OUTCOMES:

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

- **CO1:** Describe the architecture, components, and functions of computer networks, and compare OSI and TCP/IP models.
- **CO2:** Analyze the functionality of the Data Link Layer, Ethernet, VLANs, and various network protocols including ARP and IP addressing.
- **CO3:** Compare and implement routing protocols, transport protocols, and congestion control mechanisms.
- **CO4:** Examine and apply application layer protocols like HTTP, FTP, DNS, and describe real-world network applications such as VoIP and streaming.
- **CO5:** Evaluate emerging networking technologies such as SDN, NFV, IoT, and identify their significance in modern network environments and future trends.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Behrouz A. Forouzan, "Data Communications and Networking", 5th Edition, McGraw-Hill Education, 2012.
2. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", 6th Edition, Morgan Kaufmann, 2019.
3. Bhavneet Sidhu, An Integrated Approach to Computer Networks, Khanna Publishing House, 2023.
4. Mastering PC Hardware & Networking, Khanna Publishing House, 2024.

WEB SOURCES:

1. Cisco Networking Academy - Online Courses and Resources
2. NetworkLessons.com - Tutorials on Various Networking

L	T	P	O	C
0	0	2	1	1

24PBCA41 PYTHON PROGRAMMING LAB

COURSE OBJECTIVES:

- To develop the ability to write structured and efficient Python programs using control structures, functions, strings, tuples, dictionaries, and modules.
- To enable students to apply built-in and external modules (like NumPy and math) to solve problems involving data structures and numerical computations.
- To build proficiency in implementing real-time applications using string manipulations, array processing, plotting mathematical functions, and function-based programming.

LIST OF EXPERIMENTS:

1. Write a program to find whether a number is a prime number.
2. Write a program to print m raise to power n, where m and n are read from the user.
3. Write a program having a parameterized function that returns True or False depending on whether the parameter passed is even or odd.
4. Write a program to print the summation of the following series up to nterms:1-2+3-4+5- 6+7-….n
5. Write a menu driven program to perform the following operations on strings using string built in functions.
    a. Find the frequency of a character in a string.
    b. Replace a character by another character in a string.
    c. Remove the first occurrence of a character from a string.
    d. Remove all occurrences of a character from a string.
6. Write a program that accepts two strings and returns the indices of all the occurrences of the second string in the first string as a list. If the second string is not present in the first string, then it should return -1
7. Using Numpy module write menu driven program to do following
    a. Create an array filled with 1’s.
    b. Find maximum and minimum values from an array
    c. Dot product of 2 arrays.
    d. Reshape a 1-D arrayto 2-D array.

8. Write a function that takes a sentence as input from the user and calculates the frequency of each letter. Use a variable of dictionary type to maintain the count.
9. Consider a tuple t1=(1,2,5,7,9,2,4,6,8,10). Write a program to perform following operations:
    a. Print contents of t1 in 2 separate lines such that half values come on one line and other half in the next line.
    b. Print all even values of t1 as another tuple t2.
    c. Concatenate a tuple t2= (11, 13, 15) witht1.
    d. Return maximum and minimum value from t1.
10. Write a program that makes use of a function to display sine, cosine, polynomial and exponential curves.

Total Hours: 30

COURSE OUTCOMES:

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

CO1: Develop Python programs using conditionals, loops, and user-defined functions to solve mathematical and logical problems.

CO2: Implement string manipulation techniques and menu-driven programs using Python built-in functions.

CO3: Use NumPy and other libraries to perform array operations and reshape data efficiently.

CO4: Utilize Python data structures such as dictionaries and tuples to process, store, and analyze information.

CO5: Create visual representations of mathematical functions using Python libraries and understand their practical use cases.

TEXT BOOKS:

1. Venkatesh, Nagaraju Y, Introduction to Python Programming, Khanna Publishing House, 2021.
2. Jeeva Jose, Introduction to Computing & Problem Solving With PYTHON, Khanna Publishing House, 2023.
3. Sheetal Taneja & Naveen kumar: Python Programming a Modular approach – A Modular approach with Graphics, Database, Mobile and Web applications, Pearson, 2017.

REFERENCE BOOKS:

1. Think Python, by Allen Downey, 2 nd edition, 2015, O'Reilly.
2. An introduction to Python for absolute beginners, by Bob Dowling, Cambridge Univ.
3. Introduction to Computation and Programming using Python, by John Guttag, 2 nd edition, 2016, PHI India.

WEB SOURCES:

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

L	T	P	O	C
0	0	2	1	1

24PBCA42 ARTIFICIAL INTELLIGENCE USING PYTHON LAB

COURSE OBJECTIVES:

- To introduce students to fundamental AI problem-solving techniques using various search strategies, including uninformed and informed search.
- To develop the ability to implement logic-based and knowledge-based AI systems using rule-based reasoning and constraint satisfaction.
- To equip students with hands-on skills in modern AI applications such as Natural Language Processing (NLP), expert systems, and deep learning models.

LIST OF EXPERIMENTS:

1. Demonstrate basic problem-solving using Breadth-First Search on a simple grid.

2. Implement Depth-First Search (DFS) on a small graph.

3. Solve the Water Jug Problem using Breadth First Search (BFS).

4. Implement a Hill Climbing search to find the peak in a numeric dataset.

5. Apply the A* Search algorithm to find the shortest path in a 4x4 grid.

6. Implement the Minimax search algorithm for 2-player games. You may use a game tree with 3 plies.

7. Solve the 4 – Queens Problem as a CSP backtracking problem.

8. Use constraint propagation to solve a Magic Square puzzle.

9. Apply optimization techniques to find the maximum value in a list.

10. Represent and evaluate propositional logic expressions.

11. Implement a basic rule-based expert system for weather classification.

12. Implement a basic AI agent with simple decision-making rules.

13. Implement a basic Rule-Based Chatbot.

14. Using Python NLTK, performthe following Natural Language Processing (NLP) tasks for text content.

a) Tokenizing

b) Filtering Stop Words

c) Stemming

d) Part of Speech tagging

e) Chunking

f) Named Entity Recognition (NER)

15. Perform Image classification for a given dataset using CNN. You may use Tensorflow /Keras.

COURSE OUTCOMES:

CO1: Apply uninformed and informed search techniques such as BFS, DFS, Hill Climbing, and A* for solving real-world problems.

CO2: Design and implement AI strategies for adversarial games, optimization problems, and constraint satisfaction problems.

CO3: Represent and reason using propositional logic, and develop basic rule-based expert systems.

CO4: Develop simple AI agents and chatbots using rule-based logic and NLP techniques.

CO5:Implement deep learning models such as Convolutional Neural Networks (CNNs) for image classification using TensorFlow/Keras.

SEMESTER V

24CBCA51 NATURAL LANGUAGE PROCESSING

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

- To introduce the foundational concepts of Natural Language Processing, including its history, system components, and real-world applications.
- To equip students with theoretical and practical knowledge of linguistic analysis, including morphological, syntactic, and semantic processing.
- To enable students to apply machine learning and statistical models to tasks such as text classification, summarization, sentiment analysis, and named entity recognition.

UNIT I: INTRODUCTION **9**

History of NLP, Generic NLP system, levels of NLP , Knowledge in language processing , Ambiguity in Natural language , stages in NLP, challenges of NLP ,Applications of NLP, Empirical laws.

UNIT II: WORD LEVEL ANALYSIS **9**

Morphology analysis –survey of English Morphology, Inflectional morphology & Derivational morphology, Lemmatization, Regular expression, finite automata, finite state transducers (FST), Morphological parsing with FST, Lexicon free FST Porter stemmer. N –Grams - N-gram language model, N-gram for spelling correction.

UNIT III: SYNTAX ANALYSIS **9**

Part-Of-Speech tagging(POS)- Tag set for English (Penn Treebank) , Rule based POS tagging, Stochastic POS tagging, Issues –Multiple tags & words, Unknown words. Introduction to CFG, Sequence labelling: Hidden Markov Model (HMM), Maximum Entropy Self learning topics: Conditional Random Field (CRF).

UNIT IV: TEXT SUMMARIZATION, TEXT CLASSIFICATION **9**

Text summarization- LEXRANK, Optimization based approaches for summarization, Summarization evaluation, Text classification, NLKT, Naïve Bayes Theorem.

UNIT V: SENTIMENT ANALYSIS AND OPINION MINING **9**

Sentiment Analysis - Introduction, Sentiment Analysis - Affective lexicons, Learning affective lexicons, Computing with affective lexicons, Aspect based sentiment analysis, Named Entity Recognition.

Total Hours:45

COURSE OUTCOMES:

CO1: Describe the structure of a generic NLP system, its stages, challenges, and real-world applications.

CO2: Apply morphological analysis techniques such as stemming, lemmatization, and finite state transducers for word-level processing.

CO3: Implement syntax analysis using POS tagging, context-free grammar, and sequence labeling models like HMM and CRF.

CO4: Evaluate and implement text classification and summarization techniques using probabilistic and optimization approaches.

CO5: Develop sentiment analysis models using affective lexicons and perform named entity recognition for opinion mining.

TEXT BOOKS:

1. "Speech and Language Processing" (3rd Edition) by Daniel Jurafsky and James H. Martin, Pearson, 2020.
2. "Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit" (2nd Edition) by Steven Bird, Ewan Klein, and Edward Loper, O'Reilly Media, 2021.
3. "Foundations of Statistical Natural Language Processing" by Christopher D. Manning and Hinrich Schütze, MIT Press, 2020

REFERENCE BOOKS:

1. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.2.Richard M Reese, —Natural Language Processing with Java‖, O_Reilly Media, 2015.
2. Nitin Indurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapmanand Hall/CRC Press, 2010.
3. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval‖, Oxford UniversityPress, 2008.

WEB SOURCES:

1. https://www.cl.cam.ac.uk/teaching/2002/NatLangProc/nlp1-4.pdf
2. https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing- NLP
3. https://www.cs.jhu.edu/~phi/ai/slides/lecture-natural-language-processing.pdf

L	T	P	O	C
0	0	4	1	2

24PBCA51 NATURAL LANGUAGE PROCESSING LAB

COURSE OBJECTIVES:

- To provide hands-on experience with fundamental NLP tasks such as text preprocessing, vectorization, and syntactic analysis.
- To apply machine learning and statistical techniques for tasks like sentiment analysis, topic modeling, and named entity recognition.
- To enable students to build and evaluate real-world NLP applications through practical lab experiments.

LIST OF EXPERIMENTS:

1. Implement Basic Commands To Access Text Data
2. Implement Text Pre-Processing(Tokenization,Stop Word Removal,Stemming And Lemmatization)
3. Perform Morphological Analysis
4. Implement N- Gram Model
5. Implement Bag Of Word And Tf-Idf Vectorization
6. Implement Part Of Speech Tagging
7. Perform Topic Modeling
8. Implement Sentiment Analysis Of A Dataset
9. Perform Named Entity Recognition Of A Text
10. Perform One Real Time Application Using Natural Language Processing.

COURSE OUTCOMES:

- **CO1:** Implement basic text processing techniques such as tokenization, stop-word removal, stemming, and lemmatization.
- **CO2:** Demonstrate proficiency in building language models using N-Gram, Bag of Words, and TF-IDF techniques.
- **CO3:** Apply POS tagging, named entity recognition, and morphological analysis using NLP libraries.
- **CO4:** Perform sentiment analysis and topic modeling on textual data using appropriate models and tools.
- **CO5:** Design and implement a real-time NLP application by integrating various NLP components.

SEMESTER VI

24DBCA61 **GENERATIVE AI**

L	T	P	O	C
4	1	0	2	5

COURSE OBJECTIVES:

- To introduce the fundamental concepts, models, and learning paradigms in Generative AI, including GANs, VAEs, Transformers, and Diffusion Models.
- To explore practical applications of generative models across various domains such as text, image, music, games, and design
- To understand the ethical implications and future trends in the development and deployment of Generative AI technologies.

UNIT 1: INTRODUCTION TO GENERATIVE AI 10

What is Generative AI? ,Overview of supervised vs. unsupervised learning. Applications: Text, image, video generation, and beyond, Key challenges in Generative AI.

UNIT 2: GENERATIVE MODELS - THEORY AND PRACTICE 15

Generative Adversarial Networks (GANs): Architecture and working. Variational Autoencoders (VAEs): Latent space and sampling. Transformers for generative tasks (e.g., GPT, DALL-E).

UNIT 3: ADVANCED GENERATIVE MODELS 15

Diffusion Models: How they work and applications in image synthesis, Neural Style Transfer , Techniques for improving generative models (e.g., loss functions, architecture tweaks).

UNIT 4: APPLICATIONS OF GENERATIVE AI 10

Text generation (e.g., chatbots, summarization), Image generation (e.g., image-to-image translation, super-resolution), Generative AI in games, music, and design, Case studies.

UNIT 5: ETHICS AND FUTURE DIRECTIONS IN GENERATIVE AI 10

Ethical concerns: Deepfakes, biases, copyright issues , Responsible AI development and use , Future trends in Generative AI , OpenAI, Meta, Google research initiatives.

TOTAL HOURS: 60

COURSE OUTCOMES:

Upon successful completion, students will:

CO1: Explain the key concepts, types, and challenges of Generative AI and differentiate between supervised and unsupervised learning paradigms.

CO2: Apply and compare foundational generative models such as GANs, VAEs, and Transformers for various generation tasks.

CO3: Evaluate and experiment with advanced generative models like diffusion models and neural style transfer.

CO4: Demonstrate the use of generative techniques in practical domains such as chatbots, image processing, and multimedia generation.

CO5: Assess the ethical concerns, limitations, and emerging trends in the responsible development and deployment of Generative AI.

REFERENCE BOOKS:

1. **Ian Goodfellow, Yoshua Bengio, Aaron Courville** - *Deep Learning* (MIT Press).
2. **François Chollet** - *Deep Learning with Python* (Manning Publications).
3. **Sebastian Raschka, Yuxi (Hayden) Liu, Vahid Mirjalili** - *Machine Learning with PyTorch and Scikit- Learn*

RECOMMENDED BOOKS:

1. **David Foster** - *Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play* (O'Reilly Media).
2. **Andreas Holzinger** - *Machine Learning for Health Informatics* (Springer).

WEB SOURCES:

1. OpenAI - For GPT, DALL-E, and ChatGPT resources.
2. TensorFlow - Tutorials and resources for building AI models.
3. PyTorch - Guides for deep learning implementation.
4. Coursera - Generative AI Courses - Online learning resources.

SEMESTER VII

24DBCA71 **PYTHON FOR DATA SCIENCE**

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To introduce the use of IPython for enhanced interactive programming and explore fundamental operations with NumPy arrays.
- To develop skills for data manipulation, analysis, and aggregation using the Pandas library.
- To enable students to visualize and interpret datasets using Matplotlib and advanced visualization tools like Seaborn and Basemap.

UNIT I: INTRODUCTION TO IPYTHON AND NUMPY 09

IPython Beyond Normal Python: Help and documentation in IPython, Keyboard Shortcuts in the IPython Shell, IPython Magic Commands, Input and Output History, IPython and Shell Commands, Errors and Debugging, Profiling and Timing Code. Introduction to NumPy: Understanding Data Types in Python, The Basics of NumPy Arrays, Computation on NumPy Arrays: Universal Functions, Aggregations.

UNIT II: WORKING WITH NUMPY, DATA MANIPULATION WITH PANDAS 09

Computation on Arrays: Broadcasting, Comparisons, Masks, and Boolean Logic, Fancy Indexing, Sorting Arrays, Structured Data. Data Manipulation with Pandas: Introducing Pandas Objects, Data Indexing and Selection, Operating on Data in Pandas, Handling Missing Data.

UNIT III : WORKING WITH DATASETS USING PANDAS 09

Hierarchical Indexing, Combining Datasets: Concat and Append, Combining Datasets: Merge and Join, Aggregation and Grouping, Pivot Tables, Vectorized String Operations, Working with Time Series, High-Performance Pandas -eval() and query().

UNIT IV: VISUALIZATION WITH MATPLOTLIB 09

General MatplotLib, Simple Line Plots, Simple Scatter Plots, Density and Contour Plot Histograms, Binnings, and Density, Customizing Plot Legends.

UNIT V: ADVANCED VISUALIZATION TECHNIQUES 09

Customizing Colorbars, Text and Annotation, Three-Dimensional Plotting in Matplotlib, Geographic Data with Basemap, Visualization with Seaborn.

Total Hours:45

TEXTBOOK:

1. Python Data Science Handbook: Essential Tools for Working with Data, by Jake VanderPlas, O'reilly Media, 2017.

COURSE OUTCOMES:

- **CO1:** Utilize IPython features for interactive coding, debugging, and performance profiling to streamline Python workflows.
- **CO2:** Apply NumPy operations such as broadcasting, masking, fancy indexing, and structured data management for numerical computations.

  CO3: Perform advanced data handling tasks including merging, grouping, pivoting, and time-series analysis using Pandas.
- **CO4:** Create and customize various 2D plots using Matplotlib for effective data representation and interpretation.
- **CO5:** Demonstrate proficiency in using advanced visualization techniques such as 3D plots, geographic plots, and Seaborn styling for insightful data presentation.

REFERENCE BOOKS:

1. Data Science From Scratch: First Principles with Python by Joel Grus, Second Edition, 2019, O'reilly Media.
2. Python for Data Science by Mohd. Abdul Hameed, May 2021, Wiley.
3. Python for Data Science: A Crash Course for Data Science and Analysis, Python Machine Learning and Big Data by Computer Science Academy.
4. Python for Data Science: The Ultimate Step-by-Step Guide to Python Programming by Daniel, March 2021, O'reilly.

WEB SOURCES:

1. https://nptel.ac.in/courses/106/106/106106212/
2. https://www.coursera.org/professional-certificates/ibm-data-science.

MULTIDISCIPLINARY ELECTIVE (MDE)

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 inter disciplinary 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, Intersectionand 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 Hours 45

COURSE OUTCOMES:

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

CO1 : Apply the concept of Matrix and solving simultaneous equations (k3).

CO2: Understand the ideas of Sets and its applications. (K2).

CO3: Identify the relations for various functions. (K3)

CO4 : Apply the concept of partial order relation for various sets. (K5)

CO5: Understand the conversion of various number system. (K3)

TEXTBOOK:

1. Kolman, Busby, Ross and Rehman, Discrete Mathematical Structures for Computer Science, Pearson Education, 5th Edition, 2003.

REFERENCE BOOKS:

1. D.S. Malik and M.K. Sen, Discrete Mathematical Structures: Theory and Applications, Thomson, 2004.
2. Goodaire & Parmenter : Discrete Mathematics & Graph Theory, Pearson Education, 2000.
3. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill, 5th Ed., 2004.
4. C.L. Liu, Elements of Discrete Mathematics, 2nd Edition, McGraw Hill, 1986.

WEB SOURCES:

1. https://www.geeksforgeeks.org/mathematics-partial-orders-lattices/
2. https://www.ipsgwalior.org/download/number%20system.pdf

24CBCA22 **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 Hours: 45

COURSE OUTCOMES:

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

CO1: Apply the basic concepts of Mathematical reasoning.

CO2: Understands the types of logic

CO3: Understands the 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 AndJohn E.Freund), 7th edition, Pearson Education / PHI.

REFERENCE BOOKS:

1. R. P. Grimaldi, "Discrete and Combinatorial Mathematics", Pearson Education,Fifth Edition, 2007.
2. Thomas Koshy, "Discrete Mathematics with Applications", Academic Press, 2005.
3. S.I.Resnick, A Probability Path, Birhauser, Berlin,1999.

WEB SOURCES:

https://courses.umass.edu/phil110-gmh/text/c01.pdf

1. https://www.cuemath.com/data/permutations-and-combinations/

2. https://www.toppr.com/guides/maths/probability/introduction-to-probability/

24EMDE31 INDIAN KNOWLEDGE SYSTEM

L	T	P	O	C
2	0	0	1	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 KnowledgeSystem -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 Hours: 30

COURSE OUTCOMES:

CO1: Classify the key concepts of Indian Knowledge System and discuss the multi-faceted nature of knowledgecontained in the Traditional Systems of India.

CO2: Identify the rich heritage of governance in Indian Knowledge System.

CO3: Recognize the relevance of Arthashastra in public administration.

CO4: Identify the Wisdom through Ages through Ithihasas.

CO5: Knowledge of Indian Mathematicians and their contributions.

TEXT BOOKS:

1. .Kapoor Kapil, and Singh Avadesh Kumar, Indian Knowledge System Vol.1, DK PrintWorld,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

WEB SOURCES:

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

24MDE71 ADVANCED STATISTICAL METHODS FOR DATASCIENCE

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

Statistics plays an important role in data analytics. 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.

UNIT I 12

Data and Representation Introduction to Statistics, Collection of data, classification and tabulation of data, Types of data: Primary data, Secondary data, Presentation of data Diagrammatic and Graphical Representation: Histogram, frequency curve, frequency polygon, Ogive curves, stem and leaf chart.

UNIT II 12

Measures of Central Tendency and Dispersion Arithmetic Mean (A.M.) Definition, Mode, Median, Partition Values: Quartiles, Deciles and Percentiles, Box Plot, Percentile ranks. Means of transformed data, Geometric Mean (G.M.) Definition, Harmonic Mean (H.M.), Weighted Mean : Weighted A.M., G.M. and H.M. Range, Mean deviation Mean square deviation, Variance and Standard Deviation, Combined variance (derivation for 2 groups), Combined standard deviation.

UNIT III 12

Correlation and Regression Bivariate normal distribution, types, importance, methods of measuring correlation-scatter diagram, Karl Pearson's Coefficient of Correlation and Spearman's rank Correlation. Regression lines, Difference between regression and correlation, uses of Regression.

UNIT IV 12

Sampling theory and tests of significance Methods of sampling (Description only): Simple random sampling with and without replacement (SRSWR and SRWOR)

UNIT V 12

Stratified random sampling, systematic sampling. Tests of significance – z, t, chi-square and F.

Total Hours: 60

TEXT BOOKS:

1. Mood, A.M., Graybill, F.A. And Boes, D.C. : Introduction to the theory of Statistics , McGraw Hill.

2. Biswas and Srivastava – A textbook, mathematical Statistics, Ist Edition, Narosa Publishing House, New Delhi.

3. Gupta, S.C. and V.K.Kapoor - MAthematical Statistics , Sultan Chand and Sons.

4. Hogg , R.Mathe and Craig, A.T. Introduction to Mthematical Statistics, McMillan .

5. S.C.Gupta - Fundamentals of Statistics , Himalaya Publishing House

VALUE ADDED COURSE (VAC)

24SBAC12 **WEB PROGRAMMING**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

The purpose of this course is to provide comprehensive understanding to develop web applications with database systems. Started with web programming using HTML, CSS & JAVA SCRIPT.

LIST OF PROGRAMS:

1. Develop static pages usingHTML (Using Heading elements, Text Elements .
2. Logical Styles, Physical Styles,
3. Ordered, Unordered and Definition list
4. Hyper Links, Image Link, Link to page containing Images and Videos, FileLink
5. HTML Page usingFrames. (Navigation, Floating, Inline Frames , Frames to add Images and Videos
6. Add a Cascading Style sheet for designing the webpage
7. Create any catalog and display it using CSS.
8. Create a Static Web page using HTML & CSS
9. Design a dynamic web page with validation using JavaScript

Total Hours :30

COURSE OUTCOMES:

CO1: Install, configure, and interact with a database management system

CO2: Describe, define and apply the database components to database design

CO3: Analyze the design of a database schema and apply normalization techniques

CO4: Develop dynamic web pages to meet specified needs using HTML, CSS , JAVA SCRIPT

REFERENCE BOOKS:

1. Jon Duckett,HTML and CSS: Design and Build Websites,Wiley Publications , 2011.

2. Douglas Crockford, JavaScript: The Good Parts,O'Reilly Media,2008

24DVAC12 **COMMUNICATION SKILLS**

L	T	P	C	C
2	0	0	0	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 Hours:30

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

REFERENCE BOOKS:

- Basic communication skills for Technology, Andreja. J. Ruther Ford, 2nd Edition,Pearson Education, 2011
- Personality development and soft skills, Barun K Mitra, 1 stEdition, Oxford Press,2011
- Elizabeth Harren, 7 April 2022, last updated: 16 November, 2023
- Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzler (McGraw-Hill)
- Ethan Beute and Stephen Pacinelli (Greenleaf)
- Soft skills and professional communication, Francis Peters SJ, 1stEdition, McGraw Hill Education, 2011

24DVAC21 **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 existence 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 Hours: 15

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:

R.R. Gaur, R. Asthana, G.P. Bagaria. (2023). A Foundation Course in Human Values and Professional Ethics. 3rd Revised Edition. Excel Books, New

REFERENCE BOOKS:

1. A. Nagaraj, Jeevan Vidya Prakashan, Amar Kantak. Jeevan Vidya: Ek Parichaya . (1999).
2. Rakesh Gupta. (2008). Jeevan Vidya: An Introduction (Introductory Book to Madhyasth Darshan-Coexistentialism). English Version.
3. A. N. Tripathi. (2004). Human Values. First Edition. New Age International Publishers, New Delhi.

24PVAC31 YOGA AND PHYSICAL FITNESS/SPORTS/NCC/NSS/DISASTER MANAGEMENT

L	T	P	O	C
0	0	4	1	2

YOGA

COURSE OBJECTIVES:

1. Understand yoga's significance and its practical applications for holistic well-being.
2. Explore subtle energy systems and their role in enhancing health through yogic practices.
3. Examine various paths of yoga to foster self-realization and spiritual growth.
4. Master the Eight Limbs of Yoga for physical, mental, and spiritual harmony.
5. Apply yogic principles to manage psycho-somatic ailments and promote resilience.

UNIT-I 06

- Yoga: Meaning and definition
- Importance of yoga in 21st century
- Introduction to Yogic Anatomy and Physiology
- Yoga & sports, Yoga for healthy lifestyle
- Types of Yoga: - Hatha yaga, laya yoga, mantra yoga, bhakti yoga, karma yoga, jnana yoga, raj yoga
- Study of Chakras, Koshas, Pranas, Nadis, Gunas, Vayus and its application in Yogic practices.
- Ashtang Yoga: - Yama, niyama, asana, pranayama, Pratyahar, dharna, dhyan, Samadhi: Benefits, Utilities & their psychological impact on body and mind. According to yoga concept of normality in modern psychology, concept of personality & its development, yogic management of psycho- somatic ailments: frustration, anxiety, depression.

UNIT- 2 06

- Sports for Physical Fitness: Meaning and definition
- Physical Activity – Concept, Benefits of Participation in Physical Activities

- Components and Significance of Physical Fitness -Health, Skill and Cosmetic Fitness
- Types of Physical Activities – Walking, Jogging, Running, Calisthenics, Rope Skipping, Cycling, Swimming, Circuit Training, Weight training, Adventure Sports
- Principles of Physical Fitness, Warming Up, Conditioning, Cooling Down, Methods to Develop and Measure Health and Skill related components of Physical Fitness
- Measurement of Health Related Physical Fitness (HRPF)

UNIT -3 **06**

- Physical Wellness: Concept, Components
- Types of wellness: psychological, social, emotional, and spiritual.
- Significance with reference to Positive Lifestyle 2.2

UNIT-4: **06**

Nutrition and Weight Management

- Concept of Nutrients, Nutrition, Balanced Diet, Dietary Aids and Gimmicks
- Energy and Activity- Calorie Intake, Energy Balance Equation

UNIT -5 **06**

- Obesity - Concept, Causes, Obesity Related Health Problems
- Weight Management through Behavioural Modifications
- Concepts of Quality of Life and Body Image
- Factors affecting Wellness
- Wellness Programmes

Total Hours: 30

COURSE OUTCOMES:

CO1: Gain a comprehensive understanding of yoga and its modern applications for holistic well-being.

CO2: Demonstrate proficiency in yogic anatomy and physiology, enhancing yoga practice and promoting physical and energetic balance.

CO3: Master the Eight Limbs of Yoga and comprehend their psychological impact, fostering personal growth and self-realization.

CO4: Integrate yoga principles into sports and physical fitness activities to enhance performance and prevent injuries.

CO5: Develop skills in wellness management and nutrition

TEXT BOOKS:

1. Anand O P. Yog Dawra Kaya Kalp. Sewasth Sahitya Perkashan. Kanpur.
2. Brown, J.E. Nutrition Now Thomson-Wadsworth.
3. Corbin et.al.Fitness & Wellness-Concepts. McGraw Hill. Publishers. New York.U.S.A
4. Corbin, C. B., G. J. Welk, W. R Corbin, K. A. Welk, Concepts of Physical Fitness: Active Lifestyle for Wellness. McGraw Hill, New York, USA.
5. Hoeger, W W K and S.A. Hoeger. Principles and Labs for Fitness and Wellness, Thomson Wadsworth, California, USA.

REFERENCE BOOKS:

1. Siedentop, D. Introduction to Physical Education, Fitness and Sport, McGraw Hill Companies Inc., New York, USA.
2. Sri Swami Ramas. Breathing. Sadhana Mandir Trust.Rishikesh.
3. Swami Ram Yoga & Married Life Sadhana Mandir Trust. Rishikesh

SPORTS MANAGEMENT

COURSE OBJECTIVES:

- Understand the fundamental principles and concepts of sports management, including its scope, organizational structure, and ethical considerations.
- Analyse the role of marketing and sponsorship in the sports industry, with a focus on branding, target audience segmentation, and event management.
- Develop proficiency in financial management techniques specific to the sports industry, including revenue generation, cost management, and investment strategies.
- Explore the application of analytics and technology in sports, including performance evaluation, strategic decision-making, and fan engagement.
- Apply theoretical knowledge to practical scenarios through case studies and projects, fostering critical thinking and problem-solving skills in sports management context

UNIT 1: INTRODUCTION TO SPORTS MANAGEMENT

- Definition and scope of sports management
- Significance of sports management in society and its evolution over time
- Organizational structure of sports: amateur, professional, and non-profit entities
- Roles and responsibilities of key personnel: managers, coaches, and agents
- Governance bodies in sports: FIFA, IOC, and NCAA
- Legal issues: contracts, negotiations, intellectual property rights
- Ethical considerations: fair play and doping

UNIT 2: SPORTS MARKETING AND SPONSORSHIP

- Unique aspects of sports marketing
- Fan engagement strategies
- Target audience identification and segmentation
- Branding strategies for sports teams and athletes
- Sponsorship and endorsement deals
- Negotiating and managing partnerships
- Event management: planning, organizing, and promoting sports events

UNIT 3: FINANCIAL MANAGEMENT IN SPORTS

- Revenue generation in sports: ticket sales, broadcasting rights, merchandise sales
- Financial models: budgeting and forecasting
- Cost management: player salaries, facility expenses, operational costs
- Investment opportunities in sports
- Risk management techniques specific to sports organizations

UNIT 4: SPORTS ANALYTICS AND TECHNOLOGY

- Introduction to sports analytics
- Evaluating player performance
- Devising game strategies

UNIT 5:

- Fan engagement through technology
- Analytical techniques: statistical analysis, data visualization, predictive modeling
- Key performance indicators (KPIs) in sports
- Applications of analytics: talent scouting, injury prevention, performance optimization.

COURSE OUTCOMES:

1. Demonstrate a comprehensive understanding of sports management principles, including organizational structures, legal issues, and ethical considerations.
2. Evaluate marketing strategies and sponsorship opportunities in the sports industry, devising effective branding and promotional campaigns.
3. Apply financial management techniques to analyze revenue streams, control costs, and make informed investment decisions in sports organizations.
4. Utilize sports analytics tools and technology to enhance performance evaluation, strategic planning, and fan engagement initiatives.
5. Synthesize course concepts through practical applications, demonstrating the ability to address real-world challenges in sports management scenarios

TEXT BOOKS:

1. Pedersen, P. M., Thibault, L., & Pedersen, P. M. (2019). Contemporary Sport Management. Human Kinetics.
2. Hoye, R., Smith, A. C. T., Nicholson, M., et al. (2021). Sports Management: Principles and Applications. Routledge.
3. Chelladurai, P., & Kerwin, S. (2017). Introduction to Sport Management: Theory and Practice. Human Kinetics.

REFERENCE BOOKS:

1. Hoye, R., Cuskelly, G., & Nicholson, M. (2019). Sports Governance: A Guide for Sport Organizations. Routledge.
2. Conrad, M. (2018). The Business of Sports: A Primer for Journalists. Routledge.
3. Shank, M. D. (2019). Sports Marketing: A Strategic Perspective. Pearson.

NATIONAL CADET CORPS (NCC)

COURSE OBJECTIVES:

1. Understand the foundational role of drill in fostering discipline and leadership within a group, enabling effective command towards achieving common goals.
2. Appreciate the importance of grace and dignity in executing foot drill movements, recognizing their significance in enhancing performance and teamwork.
3. Comprehend the criticality of weapon handling and detailed safety measures, emphasizing the importance of accident prevention through strict adherence to safety protocols.
4. Develop an awareness of diverse terrain types and their strategic significance in battle craft, enabling informed decision-making and effective utilization of terrain features for tactical advantage

UNIT 1:

Overview of NCC, its history, aims, objectives, and organizational structure, Incentives and duties associated with NCC cadetship; Maneuvers: Foot drill, Word of Command, Attention, and stand at ease, and Advanced maneuvers like turning and sizing; Parade formations: Parade line, open line, and closed line; Saluting protocols, parade conclusion, and dismissal procedures. Marching styles: style march, double time march, and slow march

UNIT 2:

Weapon Training, Handling firearms, Introduction and characteristics of the .22 rifle; Handling Firearm techniques, emphasizing safety protocols and Best practices.

UNIT 3:

Map Reading (MR): Topographical forms and technical terms, including relief, contours, and gradients, crucial for understanding terrain features; Cardinal points , magnetic variation and grid convergence

UNIT 4:

Field Craft & Battle Craft (FC & BC): Fundamental principles and techniques essential for effective field and battle craft operations.

UNIT 5:

Methods of judging distance, including estimation, pacing, and visual cues

COURSE OUTCOMES:

1. Mastery of Discipline and Leadership through Drill Learners would demonstrate the ability to effectively command a group, foster discipline, and work collaboratively towards achieving shared objectives.
2. Mastery of Grace and Dignity in Foot Drill Performance Learners would demonstrate an understanding of how these qualities enhance performance and foster teamwork within a group setting.
3. Proficient Weapon Handling and Safety Adherence Learners would showcase a thorough understanding of the criticality of safety measures, emphasizing accident prevention through strict adherence to safety protocols.
4. Enhanced Tactical Awareness and Strategic Decision-Making Learners would gain the ability to make informed decisions and effectively utilize terrain features to gain tactical advantage during operations.

REFERENCES BOOKS:

- DGNCC Cadet's Hand Book - Common Subjects -All Wings
- Tiwari, R. (2019). NCC: Grooming Feeling of National Integration, Leadership and Discipline among Youth. Edwin Incorporation.
- Chhetri, R.S. (2010). Grooming Tomorrows Leaders, The National Cadet Corps.
- Directorate General National Cadet Corps (2003). National Cadet Corps, Youth in Action.
- Vanshpal, Ravi (2024). The NCC Days, Notion Press.

NATIONAL SERVICE SCHEME (NSS)

COURSE OBJECTIVES:

1. To provide students with an understanding of the history, philosophy, and basic concepts of the National Service Scheme (NSS).
2. To familiarize students with the aims, objectives, and organizational structure of NSS.
3. To equip students with knowledge about NSS programmes, activities, and their relevance.
4. To develop an understanding of community mobilization techniques and their importance in NSS activities.
5. To cultivate an appreciation for volunteerism, shramdan (voluntary labor), and their role in community development initiatives.

UNIT 1: INTRODUCTION AND BASIC CONCEPTS OF NSS

National Service Scheme (NSS) - history, philosophy, and fundamental concepts, aims and objectives, providing clarity on the organization's overarching goals. Symbols of NSS - Emblem, flag, motto, song, and badge; Organizational structure of NSS

UNIT 2: NSS PROGRAMMES AND ACTIVITIES

Diverse programmes and activities conducted under the aegis of the National Service Scheme (NSS); Significance of commemorating important days recognized by the United Nations, Centre, State Government, and University; Examination of the methodology for adopting villages/slums and conducting surveys; Financial patterns of the NSS scheme

UNIT 3: COMMUNITY MOBILIZATION

Dynamics of community mobilization within the framework of the National Service Scheme (NSS); Functioning of community stakeholders; The conceptual lens of community development

UNIT 4: VOLUNTEERISM AND SHRAMDAN IN THE INDIAN CONTEXT

Ethos of volunteerism and shramdan (voluntary labor) within the cultural context of India and the framework of the National Service Scheme (NSS).

UNIT 5: ROLES AND MOTIVATIONS WITHIN THE NSS FRAMEWORK

Motivations and constraints shaping volunteer engagement; Role of NSS volunteers in initiatives such as the Swatch Bharat Abhiyan and Digital India

COURSE OUTCOMES:

1. Students will demonstrate an understanding of the history, philosophy, and objectives of the National Service Scheme (NSS), thereby fostering increased social awareness and patriotism among them.

2. Students will be able to organize and conduct various NSS programmes and activities effectively and through it understand the importance of leadership and team building.

3. Students will develop skills in community mobilization and partnership building.

4. Students will appreciate the importance of volunteerism and shramdan in societal development and thus, be able to understand role of community participation.

REFERENCE BOOKS:

1. Ministry of Youth Affairs and Sports, Government of India. (2022). National Service Scheme (NSS) Manual.
2. Agarwalla, S. (2021). NSS and Youth Development. Mahaveer Publications
3. Bhattacharya, P. (2024). Stories Of NSS (English Version). Sahityasree.
4. Borah, R. and Borkakoty, B. (2022). NSS in Socioeconomic Development. Unika Prakashan.
5. Wondimu, H., & Admas, G. (2024). The motivation and engagement of student volunteers in volunteerism at the University of Gondar. *Discover Global Society*, *2*(1), 1-16.

DISASTER MANAGEMENT

COURSE OBJECTIVES:

- to provide understanding of the concepts related to disaster
- to highlight the importance and role of disaster management
- to enhance awareness of institutional processes and management strategies to mitigate the impacts of disasters

UNIT 1: CONCEPTS AND TERMINOLOGIES

Understanding key concepts of Hazards, disasters; Disaster types and causes (Geophysical, Hydrological, Meteorological, Biological and Atmospheric; Human-made); Global trends in disasters - Impacts (Physical, Social, Economic, Political, Environmental and Psychosocial); Defining Vulnerability (Physical Vulnerability; Economic Vulnerability; Social Vulnerability)

UNIT 2: KEY CONCEPTS OF DISASTER MANAGEMENT CYCLE

Components of disaster management cycle (Phases: Response and recovery, Risk assessment, Mitigation and prevention, Preparedness planning, Prediction and warning); Disaster risk reduction (DRR), Community based disaster risk reduction

UNIT 3: INITIATIVES AT NATIONAL AND INTERNATIONAL LEVEL

Disaster Risk Management in India and at international level: Related policies, plans, programmes and legislation;

UNIT 4: EMERGENCY MANAGEMENT

Explosion and accidents (Industrial, Nuclear, Transport and Mining) - Spill (Oil and Hazardous material); Threats (Bomb and terrorist attacks) - Stampede and conflicts.

UNIT 5: INITIATIVES AT INTERNATIONAL LEVEL

International strategy for disaster reduction and other initiatives

COURSE OUTCOMES:

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

1. Articulate the critical role of disaster management in reducing risks and enhancing resilience
2. Identify and describe key institutional frameworks and processes in disaster management.

REFERENCE BOOKS:

1. Sharma, S.C. (2022), Disaster Management, Khanna Book Publishing.
2. Clements, B. W., (2009): Disasters and Public Health: Planning and Response, Elsevier Inc.
3. Dunkan, K., and Brebbia, C. A., (Eds.) (2009): Disaster Management and Human Health Risk: Reducing Risk, Improving Outcomes, WIT Press, UK.
4. Singh, R. B. (ed.), (2006) Natural Hazards and Disaster Management: Vulnerability and Mitigation, Rawat Publications, New Delhi.
5. Ramkumar, Mu, (2009) Geological Hazards: Causes, Consequences and Methods of Containment, New India Publishing Agency, New Delhi.
6. Modh, S. (2010) Managing Natural Disaster: Hydrological, Marine and Geological Disasters, Macmillan, Delhi.
7. Carter, N. (1991) Disaster Management: A Disaster Management Handbook. Asian Development Bank, Manila.
8. Govt. of India (2008) Vulnerability Atlas of India. BMTPC, New Delhi.
9. Govt. of India (2011) Disaster Management in India. Ministryof Home Affairs, New Delhi.
10. Matthews , J.A., (2002) Natural Hazards and Environmental Change, Bill McGuire, Ian Mason.

WEB SOURCES:

- http://www.ndma.gov.in/en/
- http://nidm.gov.in/
- https://www.unisdr.org/
- http://www.emdat.be
- https://www.weather.gov/safety/
- https://www.preventionweb.net/risk/vulnerability

24DVAC41 **ENVIRONMENTAL STUDIES**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

1. This course aims to familiarize students with basic environmental concepts, their relevance to business operations, and forthcoming sustainability challenges.
2. This course will equip students to make decisions that consider environmental consequences.
3. This course will enable future business graduates to become environmentally sensitive and responsible managers.

UNIT 1: UNDERSTANDING ENVIRONMENT, NATURAL RESOURCES, AND SUSTAINABILITY 06

Fundamental environmental concepts and their relevance to business operations; Components and segments of the environment, the man-environment relationship, and historical environmental movements. Concept of sustainability; Classification of natural resources, issues related to their overutilization, and strategies for their conservation. Sustainable practices in managing resources, including deforestation, water conservation, energy security, and food security issues. The conservation and equitable use of resources, considering both intergenerational and intergenerational equity, and the importance of public awareness and education.

UNIT 2: ECOSYSTEMS, BIODIVERSITY, AND SUSTAINABLE PRACTICES 06

Various natural ecosystems, learning about their structure, functions, and ecological characteristics. The importance of biodiversity, the threats it faces, and the methods used for its conservation. Ecosystem resilience, homeostasis, and carrying capacity, emphasizing the need for sustainable ecosystem management. Strategies for in situ and ex situ conservation, nature reserves, and the significance of India as a mega diverse nation.

UNIT 3: ENVIRONMENTAL POLLUTION, WASTE MANAGEMENT, AND SUSTAINABLE DEVELOPMENT 06

Various types of environmental pollution, including air, water, noise, soil, and marine pollution, and their impacts on businesses and communities. Causes of pollution, such as global climate change, ozone layer depletion, the greenhouse effect, and acid rain, with a particular focus on pollution episodes in India. Importance of adopting cleaner technologies; Solid waste management; Natural and man-made disasters, their management, and the role of businesses in mitigating disaster impacts.

UNIT 4: SOCIAL ISSUES, LEGISLATION, AND PRACTICAL APPLICATIONS 06

Dynamic interactions between society and the environment, with a focus on sustainable development and environmental ethics. Role of businesses in achieving sustainable development goals and promoting responsible consumption.

UNIT 5: ENVIRONMENTAL LEGISLATION 06

Overview of key environmental legislation and the judiciary's role in environmental protection, including the Water (Prevention and Control of Pollution) Act of 1974, the Environment (Protection) Act of 1986, and the Air (Prevention and Control of Pollution) Act of 1981. Environmental justice, environmental refugees, and the resettlement and rehabilitation of affected populations; Ecological economics, human population growth, and demographic changes in India.

Total Hours :30

COURSE OUTCOMES:

1. Explore the basic environmental concepts and issues relevant to the business and management field.
2. Recognize the interdependence between environmental processes and socio-economic dynamics.
3. Determine the role of business decisions, policies, and actions in minimizing environmental degradation.
4. Identify possible solutions to curb environmental problems caused by managerial actions.
5. Develop skills to address immediate environmental concerns through changes in business operations, policies, and decisions.

TEXT BOOKS:

1. Poonia, M.P. *Environmental Studies* (3rd ed.), Khanna Book Publishing Co.
2. Bharucha, E. *Textbook of Environmental Studies* (3rd ed.) Orient Blackswan Private Ltd.
3. Dave, D., & Katewa, S. S. *Text Book of Environmental Studies.* Cengage Learning India Pvt Ltd.
4. Rajagopalan, R. *Environmental studies: from crisis to cure* (4th ed.). Oxford University Press.
5. Miller, G.T. & Spoolman S. *Living in the Environment*. (20th ed.). Cengage.
6. Basu, M., & Xavier Savarimuthu, S. J. *Fundamentals of environmental studies.* Cambridge University Press.

7. Roy, M. G. *Sustainable Development: Environment, Energy and Water Resources.* Ane Books.

8. Pritwani, K. *Sustainability of business in the context of environmental management.* CRC Press.

9. Wright, R.T. & Boorse, D.F. *Environmental Science: Toward A Sustainable Future* (13th ed,). Pearson.

WEB SOURCES:

- https://www.ourplanet.com
- :https://www.undp.org/content/undp/en/home/sustainable-development-goals.html
- www.myfootprint.org
- https://www.globalchange.umich.edu/globalchange1/current/lectures/kling/ecosystem/ecosystem.html

SKILL ENHANCEMENT COURSE (SEC)

24SSKU11 **SOFT SKILLS -I**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To learn and apply basic etiquette for personal and professional interactions.
- To develop effective stress management techniques for maintaining mental and emotional well-being.
- To enhance self-awareness for personal growth and informed decision-making.
- To gain an overview of essential 21st-century skills necessary for success in a rapidly changing world.
- 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 Hours:30

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.

REFERENCE BOOKS:

- Alex, Dr. K. (2014). Soft Skills (1st edition) S Chand & Company
- Taylor. Grant English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd 2005
- Tiko, Champa& Jaya Sasikumar. Writing with a purpose. OUP New Delhi 1979
- Nelson-Jones, R. (1992). Life skills, a handbook, Trowbridge, Wilts: Detesios Ltd.
- 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:

- To develop strategies to enhance teamwork and collaboration in professional settings.
- To cultivate a positive attitude and mindset to foster constructive relationships and productivity.
- 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, beurocratic

UNIT V - PROFESSIONAL ETIQUETTE 6

- Respect – Salutations
- Official Behaviour

Total Hours:30

COURSE OUTCOMES:

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

- Language Service, University Oberta de Catalunya
- Taylor. Grant English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd 2005
- Tiko, Champa& Jaya Sasikumar. Writing with a purpose. OUP New Delhi 1979
- Alex, Dr. K. (2014). Soft Skills (1st edition) S Chand & Company.
- 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

- CO1: To hone the creative and critical faculties of learners.
- CO2: To enhance descriptive and narrative skills through short story creation.
- CO3: To acquire professional reports and review writing skills for various mediums.
- CO4: To gain practical writing skills for television, radio, magazines, and the web, emphasizing freelance opportunities.

Unit I – 12 Hours

- Meaning and Significance of Creative Writing
- Refining Vocabulary
- Word order
- Developing Hints

Unit II – Writing Skills – 12 Hours

- Genres of Writing
- Descriptive Passages, Short Stories, Narration of incidents

Unit III – Academic Writing – 12 Hours

- Report Writing
- Writing of book reviews and film reviews

Unit IV – Writing for Media – 12 Hours

- Writing for TV, Radio and Magazine
- Freelance Writing
- Preparation of Web Content

Unit V – Advertisement Writing – 12 Hours

- Types of advertising and advertising media, Writing techniques
- Ineffective advertisement, Code of ethics for advertisement
- Advertising and marketing.

Total Hours 30 Ho

Course Outcomes

- COC1: Craft rhymes, free verse, jokes, and articles proficiently.
- COC2: Create descriptive passages and short stories to exhibit their creative writing prowess.
- COC3: Write informative reviews and structured reports for diverse media.
- COC4: Create compelling content for various platforms, adhering to ethical standards in advertising and marketing principles.

L	T	P	O	C
1	1	0	1	2

24SSKU41 DESIGN THINKING AND INNOVATION

COURSE OBJECTIVES:

- To introduce the fundamentals of design thinking as a structured creative problem-solving approach.
- To help learners observe, understand, and convert unstructured information into well-framed problems.
- To introduce ideation techniques and creativity tools for generating innovative solutions.
- To explain the significance of prototyping, experimentation, and iterative design.
- To guide students in implementing innovation projects using real-world challenges.

UNIT I BASICS OF DESIGN THINKING

Innovation – Importance of innovation in business – Creative thinking process – Problem-solving approaches – Design Thinking approach and objectives – Customer centricity – Enhancing customer experience – Parameters of product experience – Aligning customer expectations with product design – Global success stories: AirBnB, Apple, IDEO, Netflix – Design Thinking process overview: Empathize, Define, Ideate, Prototype, Implement

UNIT II EMPATHY AND PROBLEM DEFINITION

Importance of empathy in innovation – Empathy development using design tools – Observation and data assimilation – Understanding individual differences – Group activities for appreciating uniqueness – Introduction to wicked problems – Characteristics of wicked problems – Identifying wicked problems and analyzing potential impact

UNIT III IDEATION TECHNIQUES

Ideation templates – Brainstorming – Systems thinking – SCAMPER – Reaching consensus on wicked problems – Customer experience mapping – Creative thinking models – Generating multiple solution pathways – Evaluating and selecting feasible ideas

UNIT IV PROTOTYPING & IMPLEMENTATION

Purpose of prototyping – Low-fidelity and high-fidelity prototypes – Rapid prototyping – Storyboards, mock-ups, role-play prototypes – Testing prototypes – Implementation planning – Converting ideas to actionable innovation projects – Deploying solutions and evaluating performance

UNIT V FEEDBACK, ITERATION & FINAL PRESENTATION

Feedback loop – User experience focus – Identifying ergonomic challenges – User-centered design refinement – Final concept testing – Incorporating user feedback – Re-design and re-create cycles – Preparing final innovation presentations – Demonstrating creative solutions to real-world problems

COURSE OUTCOMES:

- CO1: Understand and apply the principles of design thinking to identify and solve real-world problems.
- CO2: Observe and analyze user behavior to frame well-defined and meaningful problem statements.
- CO3: Use ideation tools, brainstorming methods, and creativity techniques effectively.
- CO4: Build prototypes, test ideas, and implement innovative solutions using user-centered approaches.
- CO5: Collect feedback, refine solutions, and present final innovative concepts with clarity and impact.

TEXT BOOKS:

1. E. Balaguruswamy (2023), Developing Thinking Skills (The Way to Success), Khanna Book Publishing Company

2. Tim Brown (2008), Change by Design, Harvard Business Review Press

3. R. T. Krishnan & V. Dabholkar, 8 Steps to Innovation, Collins Publishing

REFERENCE BOOK:

1. Nigel Cross, Design Thinking, Bloomsbury

L	T	P	O	C
1	1	0	1	2

24SSKU51 Quantitative Techniques 2

1. Course Objectives (COBJ)

- COBJ1: Develop foundational numerical reasoning and analytical thinking skills.
- COBJ2: Enhance the ability to interpret, analyze, and draw conclusions from data.
- COBJ3: Strengthen logical reasoning and decision-making using quantitative tools.

2. Course Outcomes (COs)

- CO1: Apply basic numerical and reasoning skills to everyday and workplace situations.
- CO2: Interpret and analyze data using fundamental quantitative methods.
- CO3: Identify patterns and trends for simple forecasting tasks.
- CO4: Use basic probability concepts for logical reasoning and decision-making.
- CO5: Demonstrate quantitative problem-solving skills relevant to academic and professional contexts.

Unit I: Basic Numerical Competency (6 Hours)

- Introduction to quantitative reasoning
- Percentages, ratios, proportions
- Averages and simple numerical applications
- Workplace examples & aptitude-oriented problems

Unit II: Data Handling & Interpretation (6 Hours)

- Data organization: tables, charts, graphs
- Mean, median, mode – conceptual understanding
- Business and IT-based data interpretation
- Decision-making using data

Unit III: Analytical Skills – Time Series & Index Numbers (6 Hours)

- Understanding and identifying trends
- Simple forecasting examples (sales, attendance, traffic)
- Price index & inflation concepts
- Real-life analysis exercises

Unit IV: Probability for Logical Reasoning (6 Hours)

- Basic probability concepts
- Events, outcomes, likelihood
- Decision-making under uncertainty
- Logical puzzles & reasoning tasks

Unit V: Decision-Making & Problem-Solving Skills (6 Hours)

- Introduction to decision models
- Linear problem formulation (non-mathematical)
- Choosing the best alternative under uncertainty
- Workplace and academic applications

DISCIPLINE SPECIFIC ELECTIVES (DSE)

24DBCA31 **GRID COMPUTING**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To introduce the fundamental concepts, architecture, and evolution of Grid Computing and its comparison with related technologies.
- To provide a comprehensive understanding of Grid infrastructure, middleware, resource management, and scheduling techniques.
- To explore real-world applications, current technologies, security challenges, and future trends in Grid Computing.

UNIT I: INTRODUCTION TO GRID COMPUTING 09

Grid Computing Overview: Definition, history, and evolution of grid computing.-Grid vs. Cloud vs. Distributed Computing: Key differences, advantages, and challenges.-Grid Computing Architecture: Components of a grid system: resource, management, and scheduling layers.-Types of Grid Computing: Computational grid, data grid, service grid, and collaborative grid.-Applications of Grid Computing: Scientific research, healthcare, weather forecasting, financial modeling.

UNIT II: GRID ARCHITECTURE AND COMPONENTS 09

Grid Infrastructure: Key elements—resource management, resource sharing, and job scheduling-Grid Middleware: Introduction to middleware components like Globus, UNICORE, and OGSA (Open Grid Services Architecture).-Grid Resources: Virtualization of resources, resource management tools, and scheduling frameworks.-Grid Communication: Grid communication models, protocols, and message-passing mechanisms.

UNIT III: GRID COMPUTING TECHNOLOGIES AND FRAMEWORKS 09

Globus Toolkit: Overview, installation, and configuration of the Globus toolkit for grid computing.-UNICORE (Uniform Interface to Computing Resources): Architecture and working of UNICORE in grid environments.-Grid Computing Frameworks: Role of middleware and frameworks in enabling grid computing, overview of Grid-Enabled Services.

UNIT IV: GRID RESOURCE MANAGEMENT AND SCHEDULING 09

Resource Management in Grid Computing: Resource discovery, allocation, and scheduling strategies.- **Job** Scheduling Techniques: Types of scheduling (static, dynamic, and hybrid scheduling) and job prioritization.-Load Balancing: Concepts of load balancing in grid environments for efficient resource utilization.-Fault Tolerance and Recovery: Handling failures in grid systems, strategies for fault tolerance.- Performance

Evaluation: Metrics for evaluating grid performance, response time, throughput, and scalability.

UNIT V: SECURITY AND FUTURE OF GRID COMPUTING **09**

Security in Grid Computing: Challenges and security issues—authentication, authorization, encryption, and data integrity.-Grid Security Infrastructure (GSI): Overview of GSI for secure communication and access in grid systems.-Scalability and Performance: Techniques for scaling grid systems and improving performance.-Future Trends in Grid Computing: Integration with cloud computing, IoT, and big data analytics.

Total Hours:45

COURSE OUTCOMES:

CO1: Explain the principles and architecture of Grid Computing and differentiate it from cloud and distributed systems.

CO2: Analyse and illustrate the components of grid infrastructure and middleware tools like Globus and UNICORE.

CO3: Apply resource management and job scheduling techniques in a grid environment for efficient task execution.

CO4: Evaluate performance and fault tolerance strategies in grid computing systems using suitable metrics.

CO5: Identify and assess security challenges in Grid Computing and explore emerging trends such as integration with IoT and big data.

TEXTBOOKS:

1. "Grid Computing: Making the Global Infrastructure a Reality" by Fran Berman, Geoffrey Fox, and Tony Hey (Wiley, 2020)
2. "Introduction to Grid Computing" by Ian Foster, Carl Kesselman, and Steven Tuecke (Pearson, 2022)
3. "The Grid: Blueprint for a New Computing Infrastructure" by Ian Foster and Carl Kesselman (Morgan Kaufmann, 2023)

REFERENCE BOOKS:

1. **Ian Foster, Carl Kesselman, & Steven Tuecke**, *The Open Grid Services Architecture: A Research Agenda*, Springer.
2. **Rajkumar Buyya, S. Thamarai Selvi**, *Grid Computing: Techniques and Applications*, Wiley India.
3. **Tarek S. S. Abdelrahman**, *Grid Computing: Methods, Models, and Applications*, Pearson Education.
4. **Thomas Sterling, Matthew Anderson**, *The Grid 2: Blueprint for a New Computing Infrastructure*, Elsevier.
5. **M. L. G. M. Van Der Meer**, *Grid Computing: An Introduction to Distributed and Parallel Computing*, John Wiley & Sons.

WEB SOURCES

1. Globus Toolkit – http://www.globus.org/
2. Open Grid Services Architecture (OGSA) – https://www.gridforum.org/ogsa/
3. UNICORE (Universal Grid Oriented Resource Environment) – http://www.unicore.eu/
4. BOINC Project – https://boinc.berkeley.edu/
5. Grid Computing Resources – https://www.gridcomputing.com/

24DBCA 31 **FINANCIAL ACCOUNTING**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVE

To give an insight into the basics of Accounting Concepts and Principles to Prepare to Students to have the foot hold in Accounts.

UNIT I INTRODUCTION TO ACCOUNTING 12

Meaning and definition of accounting- functions of accounting – limitations of accounting – accounting concepts and conventions, systems of accounting – single entry system – double entry system – subsidiary books including cash book – trial balance – rectification of errors.

UNIT II PREPARATION OF FINAL ACCOUNTS 12

Final accounts with adjustments – closing stock, outstanding expenses, unexpired or prepaid expense, accrued income, income received in advance, depreciation, additional bad debts, provision for doubtful debts, provision for discount on debtors, interest on capital, interest on drawing, discount on creditors and creation of various reserves.

UNIT III BANK RECONCILIATION STATEMENT AND ACCOUNTS 12

Bank reconciliation statement – Importance of Bank Reconciliation Statement – Scope of Bank Reconciliation Statement - Insurance Claim Account – loss of property and stock – average clause.

UNIT IV CALCULATION OF DEPRECIATION UNDER DIFFERENT 12

Depreciation accounts – definition and causes of depreciation – need for depreciation – methods of calculating the amount of depreciation – straight line method – diminishing balance method.

UNIT V SINGLE ENTRY SYSTEM OF ACCOUNTING 12

Single entry system – salient features – limitations of single entry system – distinction between single entry system and double entry system – ascertainment of profit – net worth method – conversion method (simple problems only)

Total No of Hours : 60 Hrs

COURSE OUTCOME

At the end of this course the students can able to

CO1: Develop accounts using adjustment. Combinational circuits

CO2: Build Journal, ledger and Balance Sheet.

CO3: Analyze the depreciation under different methods CO4: Understand the basic concepts of accounting

CO5: Explain single entry and double entry system.

TEXT BOOKS:

1.T.S.Reddy&A.Murthy, "Financial Accounting", Margham Publications, Sixth Revision Edition, 2011.

2.P.C. Tulsian, "Financial Accounting", Tata MC Graw Hill Ltd, 2003.

REFERENCES:

1. Assish K. Bhattacharyya, "Financial Accounting", Prentice of hall of India, 2002.

2. N. Vinayagam and B. Charumaki, "Financial Accounting", S.Chand& Company Ltd., 2002, Reprint – 2008.

WEBSITES

1. www.accountigcoach.com

2. www.topaccountingdegrees.org

WEB SOURCES

1. https://www.csus.edu/indiv/c/clarket/course1/chap001.pdf

2. https://www.slideshare.net/ashu1983/financial-accounting

WEB SOURCES:

1. https://www.tutorialspoint.com/operating_system/operating_system_tutorial. pdf
2. https://www.cl.cam.ac.uk/teaching/1011/OpSystems/os1a-slides.pdf
3. https://www.unf.edu/public/cop4610/ree/Notes/PPT/PPT8E/CH%2002%20 OS8e.pdf
4. http://www.ddegjust.ac.in/studymaterial/mca-5/mca-105.pdf
5. http://www.svecw.edu.in/Docs%5CCSEOSLNotes2013.pdf
6. https://www.maths.ox.ac.uk/system/files/legacy/2356/basic-unix.pdf



24DBCA41 SOFTWARE ENGINEERING

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To gain a comprehensive understanding of the software development life cycle (SDLC) and modern software engineering methodologies.
- To develop the ability to manage software projects effectively using appropriate project management strategies and risk assessment techniques.
- To acquire skills in software design, architecture, testing, quality assurance, and maintenance for the development of efficient and reliable software systems.

UNIT I: INTRODUCTION 9

The evolving role of software, changing nature of software, layered technology, a process framework, Process models: The waterfall model, incremental process models, evolutionary process models, the unified process. Agile software development: Agility Principles, Agile methods, Plan-driven and agile development, Extreme programming, Scrum, A Tool Set for the Agile Process.

UNIT II: SOFTWARE REQUIREMENT SPECIFICATION 9

Software Requirements Engineering: Functional and non-functional requirements, the software requirements document, Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management. Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. Project planning- Software pricing, plan-driven development, Project scheduling, Agile planning, Estimation techniques.

UNIT III: DESIGN STRATEGIES 9

Design: Design process and design quality, design concepts, the design model, software architecture, data design, architectural design, Basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams. Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. Product metrics: Software quality, metrics for analysis model, metrics for design model,metrics for source code, metrics for testing, metrics for maintenance.

UNIT IV: QUALITY MANAGEMENT 9

Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability.

UNIT V: RELEASE MANAGEMENT 9

Release planning, development and build plans, release strategies, risk management, and post-deployment monitoring. Product sustenance: Maintenance, updates, End of life, migration strategies.

Total Hours: 45

COURSE OUTCOMES:

CO1: Explain and compare various software process models, including traditional and agile methodologies.

CO2: Analyse, specify, and manage software requirements effectively using standard requirements engineering practices.

CO3: Design structured and object-oriented models using UML diagrams and apply appropriate software testing strategies.

CO4: Evaluate and ensure software quality through appropriate metrics, reviews, and quality assurance techniques.

CO5: Plan software releases, manage post-deployment activities, and apply strategies for software product maintenance and evolution.

TEXT BOOKS:

1. Software Engineering, N.S. Gill, Khanna Publishing House, 2023 (AICTE Recommended Textbook)
2. Software Engineering, Ian Somerville, 9th edition, Pearson education.
3. Software Engineering A practitioner's Approach, 8th edition, Roger S Pressman, Bruce R. Maxim. McGraw Hill Education, 2015.

REFERENCE BOOKS:

1. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007
2. Software Engineering: Principles and Practice Hans van Vliet 2008

WEB SOURCES

1. https://www.geeksforgeeks.org/software-engineering/

   https://onlinecourses.nptel.ac.in/noc20_cs68/preview



L	T	P	O	C
3	0	0	2	3

24DBCA41 **ETHICAL HACKING**

COURSE OBJECTIVES:

- To provide foundational knowledge on system reconnaissance techniques such as footprinting, scanning, and enumeration.
- To understand system and file-level security in Windows and Unix environments, including securing permissions and services.
- To examine hacking methodologies across various platforms (networks, wireless, VPNs, etc.) and analyse security measures such as firewalls and DoS prevention.

UNIT I: CASING THE ESTABLISHMENT 9

What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services. Case study: Network Security Monitoring

UNIT II: SECURING PERMISSION 9

Securing file and folder permission, using the encrypting file System, Securing registry permissions. Securing service: Managing service permission, Default services in windows 2000 and windows XP. Unix: The Quest for Root, Remote Access vs Local access, Remote access, Local access, After hacking root.

UNIT III: HACKING 9

Dial-up, PBX, Voicemail and VPN hacking, Preparing to dial up, War-Dialing, Brute- Force Scripting PBX hacking, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media.

UNIT IV: WIRELESS HACKING 9

Wireless Foot printing, Wireless Scanning and Enumeration, Gaining Access, Tools that exploiting WEP Weakness, Denial of Services Attacks.

UNIT V: FIREWALLS 9

Firewalls landscape, Firewall Identification-Scanning Through firewalls, packet Filtering, Application Proxy Vulnerabilities, Denial of Service Attacks, Motivation of DosAttackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows Dos

Total Hours: 45

COURSE OUTCOMES:

CO1: Demonstrate the use of footprinting, scanning, and enumeration techniques to gather information about network systems.

CO2: Apply appropriate methods to secure file systems, registry settings, and services on both Windows and Unix operating systems.

CO3: Identify and analyze vulnerabilities in traditional and wireless networks, including VPN, PBX, and voicemail systems.

CO4: Evaluate wireless security threats and demonstrate the use of tools to exploit and secure wireless systems.

CO5: Assess firewall architectures and techniques for identifying, bypassing, or securing them against common network attacks, including Denial of Service (DoS).

TEXT BOOKS:

1. Mastering ethical hacking By Kris Hermans 2023 Cybellium Ltd
2. Ethical Hacking a Hands-on Introduction to Breaking in By DANIEL. GRAHAM • 2021 , No Strach Press

REFERENCE BOOKS:

1. Jul 2017 by Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, McGraw Hill Education; 3 ed (1 July 2017)
2. CEH v9: Certified Ethical Hacker Version 9 Study Guide by Sean-Philip Oriyano, Sybex; Stg edition (17 June 2016)
3. Hacking for Beginners: Ultimate 7 Hour Hacking Course for Beginners. Learn Wireless Hacking, Basic Security, Penetration Testing by Anthony Reynolds, CreateSpace Independent Publishing Platform (10 April 2017)

WEB SOURCES:

1. https://onlinecourses.nptel.ac.in/noc22_cs13/preview
2. https://www.cyberscope.in/home/course/ethical-hacking-nptel/2

24DBCA51 **INTRODUCTION TO ML**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To provide foundational knowledge of core concepts and theories relevant to the subject area.
- To develop analytical and problem-solving skills through practical applications and case studies.
- To foster the ability to work independently and in teams to design solutions for real-world challenges

UNIT I - INTRODUCTION TO MACHINE LEARNING: 9

Introduction to Machine learning: Type of Learning and Examples, basic concepts in machine learning, Computational Learning theory, Introduction to Parametric Models – Non-Parametric Models–Probability Basics.

UNIT II - SUPERVISED LEARNING: 9

Supervised Learning Algorithms Supervised Machine Learning Algorithms, working of supervised machine learning algorithm, Naive Bayes algorithm, decision tree, Support Vector Machines, KNN, Random Forest algorithm.

UNIT III - UNSUPERVISED LEARNING 9

Clustering- K-means -EM Algorithm- Mixtures of Gaussians - Dimensionality Reduction - Factor analysis – Feature Selection - Principal Component Analysis - Probabilistic PCA - Independent components analysis - Singular Value Decomposition.

UNIT IV - REINFORCEMENT LEARNING: 9

Reinforcement Learning Algorithms Reinforcement Machine Learning Algorithms, working of reinforcement machine learning algorithm, Finite Markov Decision Processes, Dynamic Programming, Monte Carlo Methods

UNIT V - APPLICATIONS AND USE CASE: 9

Ranking: Priority Inbox - Ordering Email Messages by Priority - Writing a Priority Inbox - Spam Filtering - Analyzing Social Graphs - Social Network Analysis - Hacking Twitter Social Graph Data - Analyzing Twitter Networks – Case Study.

Total Hours 45

COURSE OUTCOMES:

Accomplishment of the student after completing the course:

CO1: Apply theoretical concepts to analyze and solve domain-specific problems.

CO2: Demonstrate proficiency in using tools and techniques relevant to the field of study.

CO3: Interpret and evaluate data or scenarios to support decision-making and recommendations.

CO4: Communicate technical information effectively, both verbally and in written form.

CO5: Collaborate effectively in diverse teams and manage projects within specified timelines.

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TEXT BOOKS:

1. Ethem Alpaydın (2020), *Introduction to Machine Learning*, The MIT Press Cambridge, Fourth Edition, MIT Press Hardcover.
2. Shai Shalev-Shwartz, Shai Ben-David (2014), *Understanding Machine Learning: From Theory to Algorithms*, Cambridge University Press.

REFERENCE BOOKS:

1. V Kishore Ayyadevara (2018), *Pro Machine Learning Algorithms A Hands-On Approach to Implementing Algorithms in Python and R*, Apress
2. Kevin P. Murphy (2022), *Probabilistic Machine Learning an Introduction*. The MIT Press.

WEB SOURCES:

1. https://alex.smola.org/drafts/thebook.pdf
2. https://onlinecourses.nptel.ac.in/noc21_cs85/preview
3. https://onlinecourses.nptel.ac.in/noc21_cs70

24DBCA51 **CLOUD TECHNOLOGY**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- **To introduce the fundamental concepts** of cloud computing, including its architecture, service models, and deployment types.
- **To provide knowledge of migration strategies**, risk assessment, and business processes in cloud environments.
- **To analyze cloud service providers and best practices**, enabling students to evaluate and choose appropriate cloud solutions.

UNIT I: INTRODUCTION 9

Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, , Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

UNIT II: CLOUD COMPUTING COMPANIES AND MIGRATING TO CLOUD 9

Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies

UNIT III: ASSESSING THE CLOUD 9

Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration.

UNIT IV: GOVERNANCE IN THE CLOUD 9

Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations.

UNIT V: TEN CLOUD DO AN DO NOTS 9

Don't be reactive, do consider the cloud a financial issue, don't go alone, do think about your architecture, don't neglect governance, don't forget about business purpose, do make security the centerpiece of your strategy, don't apply the cloud to everything, don't forget about Service Management, do start with a pilot project.

Total Hours: 45

COURSE OUTCOMES:

CO1: Explain the key concepts, architecture, delivery models, and types of cloud computing.

CO2: Evaluate migration models, risk assessment strategies, and business process integration in the cloud.

CO3: Analyze and compare cloud solutions using parameters such as scalability, performance, and cost-efficiency.

CO4: Assess cloud computing standards, best practices, and issues related to interoperability and integration.

CO5: Discuss governance mechanisms, legal challenges, and data security concerns in cloud environments.

TEXT BOOKS:

1. "Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl, Ricardo Puttini, and Zaigham Mahmood, Pearson Education, 2020.
2. "Cloud Computing: Principles and Paradigms" (2nd Edition) by Rajkumar Buyya, James Broberg, and Andrzej M. Goscinski, Wiley, 2020.
3. "Architecting the Cloud: Design Decisions for Cloud Computing Service Models (IaaS, PaaS, SaaS)" (2nd Edition) by Michael J. Kavis, Wiley, 2021.

REFERENCE BOOKS:

1. Brief Guide to Cloud Computing, Christopher Barnett, Constable Robinson Limited, 2010
2. Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010.

WEB SOURCES:

1. Www.w3schools.com
2. Www.tutorialspoint.com
3. Www.geeksforgeeks.org
4. www.investopedia.com
5. www.guru99.com

24PBCA52 **MACHINE LEARNING LAB**

L	T	P	O	C
0	0	4	1	2

COURSE OBJECTIVES:

- To introduce students to fundamental and advanced concepts in data science, including statistical methods, machine learning, and data retrieval.

- To provide practical experience with key machine learning algorithms such as K-Nearest Neighbors, Naïve Bayes, and Linear Regression.

- To enable students to implement and evaluate classification and prediction algorithms using real-world data.

LIST OF EXPERIMENTS:

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result.
2. Extract the data from database using python
3. Implement k-nearest neighbors classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of kmeans clustering with 3 means (i.e., 3 centroids) periments

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.medium skiing design single twenties no -> highRisk high golf trading married forties yes -> lowRisk

low speedwaytransport married thirties yes -> medRisk medium football banking single thirties yes -> lowRisk

high flying media married fifties yes -> highRisk

low football security single twenties no -> medRisk

medium golf media single thirties yes -> medRisk

medium golf transport married forties yes -> lowRisk

high skiing banking single thirties yes -> highRisk

low golf unemployed married forties yes -> highRisk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner.

Find the unconditional probabilityof `golf' and the conditional

probability of `single' given `medRisk' in the dataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation

algorithm

10. Additional Experiments: Find-S and Candidate Elimination Algorithms

COURSE OUTCOMES:

Accomplishment of the student after completing the course:

CO1: Apply Bayes' theorem and probabilistic reasoning to solve conditional probability problems using Python.

CO2: Implement and evaluate classification algorithms such as K-Nearest Neighbors and Naïve Bayes on structured datasets.

CO3: Perform unsupervised learning using K-means clustering and analyze its impact on predictive modeling tasks.

CO4: Develop and assess regression models and neural network-based solutions (e.g., backpropagation) for data classification.

CO5: Demonstrate the use of concept learning algorithms and genetic algorithms in solving machine learning problems.

TEXT BOOKS:

3. Ethem Alpaydın (2020), *Introduction to Machine Learning*, The MIT Press Cambridge, Fourth Edition, MIT Press Hardcover.
4. Shai Shalev-Shwartz, Shai Ben-David (2014), *Understanding Machine Learning: From Theory to Algorithms*, Cambridge University Press.

REFERENCE BOOKS:

3. V Kishore Ayyadevara (2018), *Pro Machine Learning Algorithms A Hands- On Approach to Implementing Algorithms in Python and R*, Apress
4. Kevin P. Murphy (2022), *Probabilistic Machine Learning an Introduction*. The MIT Press.

WEB SOURCES:

1. https://alex.smola.org/drafts/thebook.pdf
2. https://onlinecourses.nptel.ac.in/noc21_cs85/preview
3. https://onlinecourses.nptel.ac.in/noc21_cs70

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24PBCA52 CLOUD TECHNOLOGY LAB

COURSE OBJECTIVES:

- To provide hands-on experience with virtualization technologies and cloud platforms such as VirtualBox, OpenStack, and Hadoop.
- To enable students to deploy and test cloud-based applications using real-world tools like Google App Engine and CloudSim.
- To explore the functionality and simulation of cloud environments, including file transfer, VM management, and task scheduling.

LIST OF EXPERIMENTS:

1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create hello world app and other simple web applications using python/java.
4. Use GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not presentin CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like wordcount.

COURSE OUTCOMES:

CO1: Install and configure virtual machines using VirtualBox or VMware and perform basic system-level tasks.

CO2: Deploy and run web applications using cloud platforms like Google App Engine.

CO3: Simulate cloud computing scenarios and implement scheduling algorithms using CloudSim.

CO4: Demonstrate inter-VM file transfers and operations in virtual and cloud environments like TryStack.

CO5: Set up a Hadoop single-node cluster and execute simple distributed computing tasks such as WordCount.

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TEXT BOOKS:

1. "Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl, Ricardo Puttini, and Zaigham Mahmood, Pearson Education, 2020.
2. "Cloud Computing: Principles and Paradigms" (2nd Edition) by Rajkumar Buyya, James Broberg, and Andrzej M. Goscinski, Wiley, 2020.
3. "Architecting the Cloud: Design Decisions for Cloud Computing Service Models (IaaS, PaaS, SaaS)" (2nd Edition) by Michael J. Kavis, Wiley, 2021.

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3. Www.geeksforgeeks.org
4. www.investopedia.com
5. \www.guru99.com

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24DBCA52 **CYBER SECURITY**

COURSE OBJECTIVE

- To provide foundational knowledge of cyberspace, web technologies, and the evolving landscape of cyber security and its challenges.
- To familiarize students with the types of cybercrimes, legal frameworks including the IT Act 2000, and organizational measures for mitigating cyber threats.
- To equip students with practical understanding of securing digital devices, social media usage, e-commerce platforms, and digital payment systems.

UNIT I INTRODUCTION TO CYBER SECURITY 9

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security

UNIT II CYBER CRIMEAND CYBER LAW 9

Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India, Case studies.

UNIT III SOCIAL MEDIA OVERVIEW AND SECURITY 9

Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

UNIT IV E – COMMERCE AND DIGITAL PAYMENTS 9

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), eWallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payament Settlement Act,2007

UNIT V DIGITAL DEVICES SECURITY, TOOLS AND TECHNOLOGIES FOR CYBER SECURITY 9

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

COURSE OUTCOME

CO1: To explain the architecture of cyberspace, web technologies, and internet infrastructure with respect to cyber security.

CO2: To Identify various cyber crimes and evaluate legal remedies under the IT Act 2000 and associated cyber laws in India.

CO3: To Analyze the structure and impact of social media platforms and assess the security risks and legal implications of online content.

CO4: To understand e-commerce and digital payment mechanisms, including associated frauds, security practices, and relevant legal provisions.

CO5: To Apply cyber security tools and best practices for securing personal and organizational digital devices, networks, and systems.

TEXTBOOK/ REFERENCES

1. Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition2010.

2. Cyber Security Understanding Cyber Crimes, Computer Forensics and LegalPerspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (FirstEdition, 2011)

3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities byHenry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13thNovember, 2001)

4. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.

5. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, DominantPublishers.

6. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition,Wiley India Pvt. Ltd.7. Fundamentals of Network Security by E. Maiwald, McGraw Hill

24DBCA52 **UI AND UX DESIGN**

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To introduce students to the fundamental principles of UI and UX design and the stages of the design thinking process.
- To provide hands-on understanding of design elements, patterns, branding, wireframing, prototyping, and testing in UI/UX development.
- To develop skills in user research, persona creation, usability testing, and synthesizing feedback for effective user-centered design.

UNIT I : FOUNDATIONS OF DESIGN 15

UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy

UNIT II FOUNDATIONS OF UI DESIGN 15

Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides

UNIT III FOUNDATIONS OF UX DESIGN 15

Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals

UNIT IV WIREFRAMING, PROTOTYPING AND TESTING 15

Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns - Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration

UNIT V RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE 15

Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams - Flow Mapping - Information Architecture

Total Hours :45

COURSE OUTCOMES:

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

CO1: Differentiate between UI and UX design and apply design thinking methodologies in solving design problems.

CO2: Apply visual design principles and create effective UI components aligned with branding and usability standards.

CO3: Conduct user research and interpret findings to inform UX design strategies and meet user/business goals.

CO4: Design interactive wireframes, prototypes, and high-fidelity mockups using appropriate tools and techniques.

CO5: Develop user personas, scenarios, and information architecture models to build user-centric digital solutions.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, "Designing Interface" 3 rd Edition , O'Reilly 2020
2. Steve Schoger, Adam Wathan "Refactoring UI", 2018
3. Steve Krug, "Don't Make Me Think, Revisited: A Commonsense Approach to Web & Mobile", Third Edition, 2015

WEB SOURCES:

1. https://www.nngroup.com/articles/
2. https://www.interaction-design.org/literature

24DBCA61 **BIG DATA ANALYTICS**

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To introduce the fundamental concepts of Big Data, its characteristics, value, and associated technologies like cloud computing, IoT, and Hadoop.
- To provide insights into various data generation sources and the processes of data acquisition and pre-processing.
- To explain storage mechanisms, distributed systems, and the Hadoop ecosystem including MapReduce for handling large-scale data.

UNIT I: INTRODUCTION 15

Dawn of the Big Data Era, Definition and Features of Big Data, Big Data Value, The Development of Big Data, Challenges of Big Data. RELATED TECHNOLOGIES: Cloud Computing - Cloud Computing Preliminaries, Relationship Between Cloud Computing and Big Data, IoT - IoT Preliminaries, Relationship Between IoT and Big Data, Data Center, Hadoop - Hadoop Preliminaries, Relationship between Hadoop and Big Data.

UNIT II: BIG DATA GENERATION AND ACQUISITION 15

Big Data Generation-Enterprise Data,IoT Data, Internet Data, Bio-medical Data, Data Generation from Other Fields, Big Data Acquisition- Data Collection, Data Transportation, Data Pre-processing.

UNIT III: BIG DATA STORAGE 15

Storage System for Massive Data,Distributed Storage System,Storage Mechanism for Big Data - Database Technology, Design Factors, Database Programming Model. **HADOOP & MAP REDUCE**: Data Storage and Analysis, Comparison with Other Systems, A Brief History of Hadoop , Apache Hadoop and the Hadoop Ecosystem, A Weather Dataset, Analyzing the Data with Unix Tools, Analyzing the Data with Hadoop(Map and Reduce, Java MapReduce), Scaling Out, Hadoop Streaming, Hadoop Pipes.

UNIT IV: BIG DATA ANALYSIS 15

Traditional Data Analysis, Big Data Analytic Methods, Architecture for Big Data Analysis - Real-Time vs. Offline Analysis, Analysis at Different Levels, Analysis with Different

Complexity, Tools for Big Data Mining and Analysis.

UNIT V: BIG DATA APPLICATIONS 15

Application Evolution, Big Data Analysis Fields - Structured Data Analysis, Text Data Analysis,Web Data Analysis, Multimedia Data Analysis, Network Data Analysis, Mobile Traffic Analysis, Key Applications - Application of Big Data in Enterprises, Application of IoT Based Big Data, Application of Online Social Network-Oriented Big Data,Applications of Healthcare and Medical Big Data, Collective Intelligence, Smart Grid.

Total Hours: 75

COURSE OUTCOMES:

At the end of this Course, the Student will be able to,

CO1: Explain the core features, value, and challenges of Big Data and its relationship with related technologies like Cloud, IoT, and Hadoop.

CO2: Identify and categorize various sources of Big Data and outline the methods for data collection, transportation, and pre-processing.

CO3: Describe and apply distributed storage techniques and Hadoop-based data processing including MapReduce programming.

CO4: Differentiate traditional and modern data analysis approaches and utilize appropriate tools and architectures for Big Data analytics.

CO5: Evaluate and discuss the applications of Big Data across various domains including enterprise, IoT, social networks, and healthcare.

TEXT BOOK:

1. Min Chen, Shiwen Mao, Yin Zhang,Victor C.M. Leung, "Big Data: Related Technologies, Challenges and Future Prospects", Springer; 2014 edition.

REFERENCE BOOKS:

1. Tom White, "Hadoop- The Definitive Guide", O'reilly, 2nd Edition, 2021.
2. VigneshPrajapati,"Big Data Analytics with R and Hadoop", PACKT Publishing,November 2013

WEB SOURCES:

1. Www.w3schools.com
2. Www.tutorialspoint.com
3. Www.geeksforgeeks.org
6. www.investopedia.com
7. \www.guru99.com

24DBCA61 ADVANCED DATA VISUALIZATION

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

Understand the Data security and privacy and its Use cases

- To introduce advanced techniques in data preparation, statistical analysis, and distributed computing for large-scale data analytics.
- To develop an understanding of the principles and tools used for effective data visualization and storytelling.
- To explore interactive, geospatial, and domain-specific visualization methods and platforms.

UNIT-I ADVANCED DATA ANALYTICS 09

Advanced Data Preparation: Data wrangling, cleaning, and transformation, Handling missing and imbalanced data, Feature engineering and dimensionality reduction (PCA, t-SNE, UMAP).
Advanced Statistical Analysis: Hypothesis testing, time series analysis, advanced regression techniques, Bayesian analysis.Big Data Analytics: Distributed computing with Apache Spark, Machine learning pipelines in big data frameworks.

UNIT-II DATA VISUALIZATION FUNDAMENTALS 09

Principles of Data Visualization: Importance of storytelling in visualization, Understanding perception and visual encoding (color, size, position).Types of visualizations: Line charts, scatter plots, heat maps, etc.
Tools for Data Visualization: Python libraries: Matplotlib, Seaborn, Plotly, Bokeh.Dash boarding tools: Tableau, Power BI, Looker. Cloud-based visualization tools: Google Data Studio.

UNIT-III INTERACTIVE AND ADVANCED VISUALIZATIONS 09

Interactive Visualization Techniques, Plot and Dash for interactive web apps, JavaScript-based libraries: D3.js, Streaming data visualization.
Advanced Visualization Types: Geospatial visualizations (Mapbox, Kepler.gl), Network graphs and hierarchy visualizations, 3D visualizations and VR/AR integration.
Data Storytelling: Narrative techniques for visual storytelling, Combining text, visuals, and interactivity.

UNIT-IV DOMAIN-SPECIFIC APPLICATIONS 09

Finance: Stock market analysis and visualization, Risk assessment and portfolio visualization. Healthcare: Patient data analysis and medical imaging, Epidemiological visualizations (COVID-19 dashboards).
Geospatial Analytics: Heat maps, choropleth maps, and satellite data visualization, Geospatial tools: QGIS, ArcGIS.
Marketing and Social Media: Sentiment analysis and campaign performance dashboards.

UNIT-V ETHICS, EVALUATION, AND TRENDS 09

Ethical Issues in Data Analytics and Visualization: Misleading visualizations and bias, Ensuring privacy and compliance (e.g., GDPR, CCPA). Evaluating Data Visualizations: Visualization quality

metrics (accuracy, clarity, efficiency), User testing for interactive visualizations.Emerging Trends: AI-driven visualization (NLP-generated

visual summaries), Real-time visual analytics and edge computing, Use of generative AI in visualization design.

Total Hours: 45

COURSE OUTCOMES:

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

CO1: Perform advanced data wrangling, feature engineering, and apply distributed analytics using tools like Apache Spark.

CO2: Create clear and impactful visualizations using libraries and platforms such as Matplotlib, Plotly, Tableau, and Power BI.

CO3: Design interactive and advanced visualizations including geospatial, hierarchical, and streaming data using modern frameworks like D3.js and Mapbox.

CO4: Apply visualization techniques in various domains such as finance, healthcare, and marketing for data-driven decision-making.

CO5: Evaluate the quality and ethics of visualizations, and assess modern trends including AI-assisted visual storytelling and real-time analytics.

TEXT BOOKS:

1. "Interactive Data Visualization for the Web" by Scott Murray
2. "Storytelling with Data: A Data Visualization Guide for Business Professionals" by Cole Nussbaumer Knaflic

REFERENCE BOOKS:

1. "Architecting the Cloud: Design Decisions for Cloud Computing Service Models (IaaS, PaaS, SaaS)" by Michael J. Kavis
2. "The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios" by Steve Wexler, Jeffrey Shaffer, and Andy Cotgreave.
3. "Visualize This: The FlowingData Guide to Design, Visualization, and Statistics" by Nathan Yau.

WEB SOURCES:

1. Www.w3schools.com
2. Www.tutorialspoint.com
3. Www.geeksforgeeks.org
4. www.investopedia.com
5. \www.guru99.com



4PBCA62 BIG DATA ANALYTICS LAB

L	T	P	O	C
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COURSE OBJECTIVES:

- To equip students with the knowledge and skills required to set up and configure a Hadoop cluster, both in single-node and multi-node environments.
- To demonstrate the application of Hadoop's MapReduce framework for performing data analysis tasks such as word counting and clustering.
- To provide practical experience in working with NoSQL databases, performing data operations, and querying unstructured data.

LIST OF EXPERIMENTS:

1. Set up a pseudo-distributed, single-node Hadoop cluster backed by the Hadoop Distributed File System, running on Ubuntu Linux. After successful installation on one node, configuration of a multi-node Hadoop cluster (one master and multiple slaves)
2. MapReduce application for word counting on Hadoop cluster
3. Unstructured data into NoSQL data and do all operations such as NoSQL query with API.
4. K-means clustering using map reduce
5. Page Rank Computation
6. Mahout machine learning library to facilitate the knowledge build up in big data analysis.
7. Application of Recommendation Systems using Hadoop/mahout libraries.

Total Hours: 30

COURSE OUTCOMES:

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

CO1: Set up and configure a pseudo-distributed Hadoop cluster on a single-node, followed by the configuration of a multi-node Hadoop cluster.

CO2: Implement MapReduce applications for data processing tasks such as word counting on a Hadoop cluster.

CO3: Perform data operations on NoSQL databases, including query operations and manipulation of unstructured data.

CO4: Implement and execute K-means clustering and Page Rank computations using Hadoop's MapReduce framework.

CO5: Apply Mahout machine learning libraries to build recommendation systems and gain insights into big data analytics using distributed computing frameworks.

TEXT BOOK:

1. Min Chen, Shiwen Mao, Yin Zhang,Victor C.M. Leung, "Big Data: Related Technologies, Challenges and Future Prospects", Springer; 2014 edition.

REFERENCE BOOKS:

1. Tom White, "Hadoop- The Definitive Guide", O'reilly, 2nd Edition, 2021.
2. VigneshPrajapati,"Big Data Analytics with R and Hadoop", PACKT Publishing,November 2013.

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4. www.investopedia.com
5. \www.guru99.com

24PBCA62 **DATA VISUALIZATION LAB**

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0	0	4	1	2

COURSE OBJECTIVES:

Students will be able to

- To introduce students to various data visualization tools and their use cases.
- To provide hands-on experience in creating basic visualizations using Python and R.
- To teach students the fundamentals of Tableau, from installation to building basic dashboards.

LIST OF EXPERIMENTS:

1. Introduction to various Data Visualization tools
2. Basic Visualization in Python
3. Basic Visualization in R
4. Introduction to Tableau and Installation
5. Connecting to Data and preparing data for visualization in Tableau
6. Data Aggregation and Statistical functions in Tableau
7. Data Visualizations in Tableau
8. Basic Dashboards in Tableau

COURSE OUTCOMES:

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

- **CO1:** Identify and describe the different types of data visualization tools and their applications in data analysis.
- **CO2:** Create basic data visualizations in Python using libraries like Matplotlib, Seaborn, or Plotly.
- **CO3:** Build basic visualizations in R, leveraging packages like ggplot2 for data exploration and presentation.
- **CO4:** Install and configure Tableau, and connect it to various data sources to prepare data for visualization.
- **CO5:** Apply aggregation and statistical functions within Tableau to create meaningful insights and build interactive dashboards.

REFERENCE BOOKS:

1. Data visualization with python: create an impact with meaningful data insights using interactive and engaging visuals, Mario Dobler, Tim Grobmann, Packt Publications, 2019
2. Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master, Ryan Sleeper, Oreilly Publications, 2018
3. Data Visualization with R: 111 Examples by Thomas Rahlf, Springer, 2020

WEB SOURCES:

1. Www.w3schools.com
2. Www.tutorialspoint.com
3. Www.geeksforgeeks.org
4. www.investopedia.com
5. \www.guru99.com

L	T	P	O	C
3	2	0	2	5

24DBCA62 EXPLORATORY DATA ANALYSIS

COURSE OBJECTIVES:

- To introduce students to the fundamental concepts of statistical methods and their role in managerial decision-making.
- To develop an understanding of data collection, presentation, and descriptive analysis techniques such as measures of central tendency and dispersion.
- To familiarize students with probability theory, distribution models, and their real-world applications in statistics.

UNIT – I INTRODUCTION TO STATISTICAL METHODS 09

Introduction to Statistical Methods Statistics & Managerial Decisions, Statistical Data, Operation Research Techniques

UNIT – II DATA COLLECTION AND ANALYSIS 09

Collection and presentation of data in terms of tables, graphs, raw data, frequency distributions, histogram etc. Cumulative frequency curve, Measures of central tendency and location, Partition values, Comparison of various measures of central tendencies, Measures of dispersion, skewness & kurtosis, comparison of various measures of dispersion

UNIT – III PROBABILITY DISTRIBUTION & STATISTICS 09

Introduction of Probability, sample, space & events, Basic rules of probability, permutation & combinations, conditional probability, Bayes' theorem, distributions: Binomial, Poisson, Exponential and Normal distribution with their properties and application. Random variables – discrete and continuous probability distribution functions

UNIT – IV CORRELATION AND REGRESSION ANALYSIS 09

Curve fitting, correlation and regression analysis, Autocorrelation, Multiple regression, statistical Inference & estimation applied to Industrial problems 6 5. Understanding Data for Exploratory Analysis Exploratory data analysis and data visualization, Perception, Continuous variables, Discrete variables, Dependency relationships, Multivariate categorical variables, Temporal data, Spatial data Data Science Pipeline: Collect, Import, Clean, Transform, Visualize, Model, Communicate

UNIT V – STATISTICAL TESTS AND TESTING OF HYPOTHESIS 09

Elementary theory and practice of sampling, standard error or means and variance, tests of significance, T test, F test, Z test and chi-square test along with their applications, Goodness of fit,

testing of hypotheses and decision making, analysis of variance (ANOVA)

Total Hours: 45

COURSE OUTCOMES:

After completion of this subject, students would be able to:

- **CO1:** Describe the role of statistical methods in managerial decision-making and operations research techniques.
- **CO2:** Collect, organize, and present data using various methods such as tables, graphs, frequency distributions, and histograms. Calculate and interpret measures of central tendency and dispersion.
- **CO3:** Apply probability theory and probability distributions (e.g., Binomial, Poisson, Normal) to real-world problems and calculate conditional probabilities using Bayes' theorem.
- **CO4:** Perform correlation and regression analysis, including multiple regression, and apply statistical inference techniques to industrial problems.
- **CO5:** Conduct hypothesis testing (e.g., T-test, F-test, Chi-square) and analyze data using tests for significance and analysis of variance (ANOVA) for decision-making.

TEXT BOOK:

1. Engineering Statistics Handbook Exploratory Data Analysis With R, Roger D.Peng
2. Interactive Data Visualization for the Web, Scott Murray
3. Advanced **Analytics** with R and Tableau, Jen Stirrup, Packt Publications

REFERENCE BOOKS:

1. Quantitative Techniques for Managerial Decision by U. K. Srivastava, G. V. Shenoy and S. C. Sharma New Age International Publishers
2. Probability & Statistics for Engineers by Rao SCITECH
3. Statistics for Management by Lewis Pearson
4. Graphical Data Analysis with R by Unwin, Antony CRC Press, 2015 ISBN 978-1498715232
5. Interactive Data Visualization for the Web by Scott Murray O'REILLY, Second edition, ISBN-13: 978-149192

WEB SOURCES

1. https://poldham.github.io/ggplot_pizza_patents_part2j/
2. https://www.tableau.com/solutions/topic/r

24DBCA62 **EDGE COMPUTING**

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To understand the fundamentals of Edge Computing and IOT, including definitions, use cases, and hardware architectures.
- To analyze IOT architectures and core modules, recognizing the differences between IOT, machine-to-machine (M2M), and SCADA systems and the value of connected networks.
- To gain hands-on experience with Raspberry Pi as a microcomputer, including setup, configuration, and programming for IOT applications.

UNIT-I **09**

IoT and Edge Computing Definition and Use Cases Introduction to Edge Computing Scenario's and Use cases - Edge computing purpose and definition, Edge computing use cases, Edge computing hardware architectures.

UNIT-II **09**

IoT Architecture and Core IoT Modules-A connected ecosystem,IoT versus machine-to-machine versus, SCADA, The value of a network and Metcalfe's and Beckstrom's laws, IoT and edge architecture, Role of an architect, Understanding Implementations with examples-Example use case and deployment.

UNIT-III **09**

RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout and Pinouts, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi, Connecting Raspberry Pi via SSH.

UNIT-IV **09**

Implementation of Microcomputer RaspberryPi and device Interfacing, Edge to Cloud Protocols Protocols, MQTT, MQTT publish-subscribe, MQTT architecture details, MQTT state transitions, MQTT packet structure, MQTT data types, MQTT communication formats.

UNIT-V **09**

Edge computing Concepts - Reference Architecture - Edge Computing in the IoT–Edge Analytics and Data Management -Use Cases.

Total Hours 45

COURSE OUTCOMES:

CO1: Demonstrate understanding of Edge Computing and IOT fundamentals

CO2: Analyze and design IOT architectures

CO3: Configure and program Raspberry Pi for IOT applications

CO4: Implement and manage edge-to-cloud communication protocols

CO5: Apply edge analytics and data management techniques

TEXT BOOKS:

1. "Mastering Internet of Things: Design and Implement Edge Computing" by Peter Waher, Packt Publishing, 2020.
2. "Raspberry Pi Cookbook: Software and Hardware Problems and Solutions" (4th Edition) by Simon Monk, O'Reilly Media, 2022.
3. "Internet of Things (IoT): Architecture, Implementation, and Security" by Rajkumar Buyya and Amir Vahid Dastjerdi, Wiley, 2021.

REFERENCE BOOKS:

1. Fog and Edge Computing: Principles and Paradigms by Rajkumar Buyya, Satish Narayana Srirama, wiley publication, 2019, ISBN: 9781119524984.
2. David Jensen, "Beginning Azure IoT Edge Computing: Extending the Cloud to the Intelligent Edge, MICROSOFT AZURE.
3. Ajit Singh, "Edge Computing", Shroff Publishers, 2019.
4. Perry Lea, "IoT and Edge Computing for Architects", Packt publishers, 2020.

WEB SOURCES:

1. Www.w3schools.com
2. Www.tutorialspoint.com
3. Www.geeksforgeeks.org
4. www.investopedia.com
5. \www.guru99.com

24DBCA72 BUSINESS INTELLIGENCE AND ANALYTICS

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To introduce students to the foundational concepts of business intelligence, decision support systems, and business analytics, with a focus on their role in decision-making.
- To explain the phases of decision-making and the components and capabilities of decision support systems (DSS).
- To provide an in-depth understanding of neural networks, support vector machines, sentiment analysis, and their applications in decision-making and analytics.

UNIT I - AN OVERVIEW OF BUSINESS INTELLIGENCE 09

Analytics, and Decision Support Information Systems Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems, A Framework for Business Intelligence, Business Analytics Overview, Brief Introduction to Big Data Analytics,

UNIT II - DECISION MAKING INTRODUCTION AND DEFINITIONS 09

Phases of the Decision, Making Process, The Intelligence Phase, Design Phase, Choice Phase, Implementation Phase, Decision Support Systems Capabilities, Decision Support Systems Classification, Decision Support Systems Components.

UNIT III - NEURAL NETWORKS AND SENTIMENT ANALYSIS 09

Basic Concepts of Neural Networks, Developing Neural Network-Based Systems, Illuminating the Black Box of ANN with Sensitivity, Support Vector Machines, A Process Based Approach to the Use of SVM, Nearest Neighbor Method for Prediction, Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process,, Sentiment Analysis, Speech Analytics.

UNIT IV - MODEL-BASED DECISION MAKING 09

Decision Support Systems modeling, Structure of mathematical models for decision support, Certainty, Uncertainty, and Risk, Decision modeling with spreadsheets,Mathematical programming optimization, Decision Analysis with Decision Tables and Decision Trees, Mul ti-Criteria Decision

Making With Pairwise Comparisons

UNIT V- AUTOMATED DECISION SYSTEMS AND EXPERT SYSTEMS 09

Automated Decision Systems, The Artificial Intelligence field, Basic concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems.

Total Hours: 45

COURSE OUTCOMES:

CO1: Understand and explain the role of business intelligence and decision support systems in aiding decision-making, including the concept of big data analytics.

CO2: Describe the phases of the decision-making process and identify the components and capabilities of decision support systems (DSS) in each phase.

CO3: Implement neural network-based systems and apply support vector machines and nearest neighbor methods for prediction and sentiment analysis tasks.

CO4: Apply decision modeling techniques using spreadsheets, mathematical programming, and multi-criteria decision-making methods like decision tables and decision trees.

CO5: Understand the structure and functioning of automated decision systems and expert systems, and develop expert systems using knowledge engineering principles.

TEXT BOOKS:

1. Ramesh Sharda, Dursun Delen, EfraimTurban, J.E.Aronson,Ting-Peng Liang, David King, "Business Intelligence and Analytics: System for Decision Support", 10th Edition, Pearson Global Edition, 2013

REFERENCE BOOKS:

1. Data Analytics: The Ultimate Beginner's Guide to Data Analytics Paperback – 12 November 2017 by Edward Mize
2. Data Analytics and Business IntelligenceComputational Frameworks, Practices, and Applications Edited By Vincent Charles, Pratibha Garg, Neha Gupta, Mohini Agarwal

WEB SOURCES:

1. https://onlinecourses.nptel.ac.in/noc25_cs09/preview
2. https://www.oreilly.com/library/view/data-analytics-and/9781000909302/

24DBCA72 **DATA WAREHOUSING AND DATA MINING**

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To introduce students to the concept of data warehousing, its architecture, and its components, with an emphasis on OLAP and OLTP systems.
- To provide an understanding of data mining, its processes, challenges, and tasks, and the techniques involved in data preprocessing.
- To teach students the methods and algorithms for association rule mining, including APRIORI, FP-Growth, and other algorithms for frequent item set generation.

UNIT I: **09**

Data Warehouse: Introduction to Data Ware House, Differences between operational database systems and data Ware House, Data Ware House characteristics, Data Ware House Architecture and its components, Extraction-Transformation-Loading, Logical (MulitDimensional), Data Modeling, Schema Design, star and snow-Flake Schema, Fact Constellation, Fact Table, Fully Addictive, Semi-Addictive, Non-Addictive Measures; FactLess-Facts, Dimension Table characteristics; Fact- Less-Facts, Dimension Table characteristics; OLAP cube, OLAP Operations, OLAP Server Architecture-ROLAP, MOLAP and HOLAP.

UNIT II: **09**

Introduction to Data Mining: Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing- Data Cleaning, Missing Data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation , Data Transformation; Measures of similarity and dissimilarity-Basics.

UNIT III: **09**

Association Rules: Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation, APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

UNIT IV: **09**

Classification: Problem definition, General Approaches to solving a classification problem, Evaluation

of Classifiers, Classification techniques, Decision trees-Decision Tree Construction, Methods for expressing attribute test conditions, Measures for Selecting the Best split, Algorithm for Decision tree Induction, Naïve-Bayes Classifier, Bayesian Belief Networks; K-nearest Neighbor classification-Algorithm and characteristics.

UNIT V: **09**

Clustering: Problem Definition, Clustering overview, Evaluation of clustering algorithms, Partitioning clustering K-Means Algorithm, K-Means Additional Issues, PAM Algorithm, Hierarchical Clustering-Algorithm- Agglomerative Methods and Divisive Methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and weakness, Outlier Detection

Total Hours : 45

COURSE OUTCOMES:

CO1: Understand the core concepts of data warehousing, including the differences between operational databases and data warehouses, and the various schemas and OLAP operations.

CO2: Describe the fundamental processes of data mining and data preprocessing, including handling missing data, dimensionality reduction, and data transformation.

CO3: Implement association rule mining techniques using algorithms like APRIORI, FP-Growth, and understand the generation of frequent item sets and association rules.

CO4: Apply classification techniques such as decision trees, Naïve-Bayes, and K-nearest Neighbor to classify data, and evaluate the effectiveness of these classifiers.

CO5: Understand clustering techniques, apply algorithms like K-Means and hierarchical clustering, and evaluate clustering results to detect patterns or outliers in datasets.

TEXT BOOKS:

1) Data Mining-Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.

2) Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.

REFERENCE BOOKS:

1) Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.

2) Data Ware Housing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.

3) The Data Ware House Life Cycle Toolkit- Ralph Kimball, Wiley Student Edition.

4) Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University

WEB SOURCES:

1. Www.w3schools.com
2. Www.tutorialspoint.com
3. Www.geeksforgeeks.org
4. www.investopedia.com
5. www.guru99.com

24DBCA73 **PREDICTVE ANALYSIS**

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To introduce students to the foundations of predictive analytics, including setting up a problem, data understanding, and the importance of data visualization and statistical significance.

- To provide knowledge of data preparation techniques, including variable cleaning, feature creation, and the application of association rules in predictive modeling.

- To explore descriptive modeling methods, principal component analysis (PCA), and clustering algorithms for model interpretation and data analysis.

UNIT I INTRODUCTION TO PREDICTIVE ANALYTICS 09

Overview of Predictive Analytics- Setting up the Problem - Data Understanding- SingleVariable- Data Visualization in One Dimension- Data Visualization, Two or Higher Dimensions- The Value of Statistical Significance- Pulling It All Together into a Data Audit.

UNIT II DATA PREPARATION AND ASSOCIATION RULES 09

Data Preparation- Variable Cleaning- Feature Creation- Item sets and Association Rules- Terminology- Parameter Settings- How the Data Is Organized- Measures of Interesting Rules- Deploying Association Rules- Problems with Association Rules- Building Classification Rules from Association Rules.

UNIT III MODELLING 09

Descriptive Modeling- Data Preparation Issues with Descriptive Modeling- Principal Component Analysis- Clustering Algorithms- Interpreting Descriptive Models- Standard Cluster Model Interpretation

UNIT IV PREDICTIVE MODELLING 09

Decision Trees- Logistic Regression -Neural Network Model – K-Nearest Neighbours – Naive Bayes – Regression Models - Linear Regression - Other Regression Algorithms.

UNIT V TEXT MINING 09

Motivation for Text Mining- A Predictive Modeling Approach to Text Mining- Structured vs. Unstructured Data- Why Text Mining Is Hard- Data Preparation Steps- Text Mining Features- Modeling with Text Mining Features- Regular Expressions- Case Studies:- Survey Analysis.

Total Hours 45

COURSE OUTCOMES:

CO1: Understand the key concepts of predictive analytics, including problem setup, data understanding, and the significance of data visualization in one or more dimensions.

CO2: Prepare data for predictive modeling, including techniques for variable cleaning, feature creation, and applying association rules to build classification rules.

CO3: Apply descriptive modeling techniques, including clustering algorithms and principal component analysis (PCA), to interpret and analyze complex datasets.

CO4: Implement and evaluate predictive modeling techniques such as decision trees, logistic regression, neural networks, K-nearest neighbors, Naive Bayes, and regression models for various types of problems.

CO5: Understand and apply text mining techniques, including data preparation, feature extraction, and modeling with text data, and overcome challenges in handling unstructured data for predictive modeling.

TEXT BOOKS:

1. Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" by Eric Siegel (2020, 2nd Edition)
2. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett (2020, 2nd Edition
3. "Data Preparation for Data Mining Using SAS" by Mamdouh Refaat (2020)

WEB SOURCES:

1. www.ibm.com/predictive_analytics □
2. www.predictiveanalyticsworld.com/predictive_analytics.php
3. www.sas.com/en_us/insights/analytics/predictive-analytics.html
4. www.inc.com/internet/articles/201006/chittoor.html □
5. www.kaushik.net/.../data-mining-and-predictive-analytics-on-web-data-works-nyet

24DBCA73 **DEEP LEARNING**

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To introduce the fundamental concepts of probability theory, information theory, and optimization techniques that are foundational to machine learning and deep learning.

- To provide students with an understanding of machine learning basics, including supervised and unsupervised learning, hyperparameters, and stochastic gradient descent.

- To teach regularization techniques in deep learning, including parameter norm penalties, data augmentation, semi-supervised learning, and various optimization strategies for training deep models.

UNIT I PROBABILITY AND INFORMATION THEORY 09

Random Variables- Probability Distributions- Marginal Probability- Conditional Probability- Expectation- Variance and Covariance- Bayes' Rule-Information Theory - Numerical Computation- Overflow and Underflow- Gradient-Based Optimization- Constrained Optimization- Linear Least Squares.

UNIT II MACHINE LEARNING BASICS 09

Machine Learning Basics and under fitting, Hyper parameters and Validation Sets Estimators- Bayesian Statistics- Supervised and Unsupervised Learning-Stochastic Gradient Descent- Challenges Motivating Deep Learning. Deep Feed forward Networks: Learning XOR- Gradient-Based Learning- Hidden Units-Architecture Design- Back- Propagation and other Differentiation Algorithms.

UNIT III REGULARIZATION FOR DEEP LEARNING 09

Regularization for Deep Learning: Parameter Norm Penalties- Norm Penalties as Constrained Optimization- Regularization and Under-Constrained Problems- Dataset Augmentation- Noise Robustness- Semi-Supervised Learning- Multi-Task Learning- Optimization for Training Deep Models: Pure Optimization- Challenges in Neural Network Optimization- Basic Algorithms- Algorithms with Adaptive Learning Rates- Optimization Strategies and Meta-Algorithms.

UNIT IV CONVOLUTIONAL NETWORKS 09

Convolutional Networks: The Convolution Operation, Pooling- Convolution- Basic Convolution Functions -Structured Outputs, Data Types -Efficient Convolution Algorithms- Random or Unsupervised Features -Basis for Convolutional Networks.

UNIT V SEQUENCE MODELLING 09

Sequence Modeling: Recurrent and Recursive Nets- Unfolding Computational Graphs- Recurrent

Neural Networks- Bidirectional RNNs-Deep Recurrent Networks - Recursive Neural Networks- Echo State Networks- LSTM –Gated RNNs- Optimization for Long- TermDependencies.

Total Hours: 45

COURSE OUTCOMES:

At the End of this course, the Student will be able to:

CO1: Understand and apply the concepts of random variables, probability distributions, Bayes' Rule, and information theory, and use optimization techniques like gradient-based methods and linear least squares for solving machine learning problems.

CO2: Gain a strong foundation in machine learning algorithms, including supervised and unsupervised learning, hyperparameters, and validation techniques, and implement deep feedforward networks using backpropagation and other differentiation algorithms.

CO3: Apply regularization techniques such as parameter norm penalties, dataset augmentation, and semi-supervised learning to prevent overfitting and enhance the robustness of deep learning models.

CO4: Understand the workings of convolutional neural networks, including the convolution operation, pooling techniques, and efficient algorithms for CNN-based learning, and apply these techniques to real-world tasks.

CO5: Develop and optimize sequence models, including RNNs, LSTMs, and recursive neural networks, to handle long-term dependencies in sequence data, and apply optimization techniques to improve model performance.

TEXT BOOKS:

1. "Deep Learning with Python" by François Chollet (2021, 2nd Edition)
2. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron (2022, 2nd Edition)
3. "Bayesian Reasoning and Machine Learning" by David Barber (2020, 2nd Edition)

REFERENCE BOOKS:

1. Nikhil Buduma, O'Reilly, Fundamentals of Deep Learning, Designing next- generation machine intelligence algorithms, Shroff Publishers, 2019.
2. Douwe Osinga, O'Reilly,Deep learning Cook Book, Practical recipes to get started Quickly, Shroff Publishers, 2019.

WEB SOURCES:

1. https://keras.io/datasets/
2. http://deeplearning.net/tutorial/deeplearning.pdf
3. https://arxiv.org/pdf/1404.7828v4.pdf

24DBCA81 **OPERATING SYSTEMS**

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To introduce the fundamental concepts and components of operating systems, including their evolution, structure, and services.
- To understand and analyse key operating system functionalities such as process management, memory management, file systems, and storage handling.
- To explore modern OS topics such as virtualization, mobile operating systems, and the role of OS in emerging technologies.

UNIT 1: INTRODUCTION 9

Computer System – Elements and organization; Operating System Overview - Objectives and Functions - Evolution of Operating System; Operating System Structures – Operating System Services - User Operating System Interface - System Calls – System Programs - Design and Implementation - Structuring methods.

UNIT 2: PROCESS MANAGEMENT 9

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication; CPU Scheduling - Scheduling criteria - Scheduling algorithms: Threads - Multithread Models – Threading issues; Process Synchronization - The Critical-Section problem - Synchronization hardware – Semaphores – Mutex - Classical problems of synchronization - Monitors; Deadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT 3: MEMORY MANAGEMENT 9

Main Memory - Swapping - Contiguous Memory Allocation – Paging - Structure of the Page Table - Segmentation, Segmentation with paging; Virtual Memory - Demand Paging – Copy on Write - Page Replacement - Allocation of Frames –Thrashing.

UNIT 4: STORAGE MANAGEMENT 9

Mass Storage system – Disk Structure - Disk Scheduling and Management; File-System Interface - File concept - Access methods - Directory Structure - Directory organization - File system mounting -File Sharing and Protection; File System Implementation - File System Structure Directory implementation - Allocation Methods - Free Space Management; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem.

UNIT 5: VIRTUAL MACHINES AND MOBILE OS 9

Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS - iOS and Android.

Total Hours: 45

COURSE OUTCOMES:

CO1: Describe the architecture and services of operating systems, and explain the purpose of system calls and system programs.

CO2: Apply scheduling algorithms and synchronization techniques to manage processes and resolve concurrency issues.

CO3: Analyze memory management strategies such as paging, segmentation, and virtual memory for efficient resource allocation.

CO4: Demonstrate understanding of file system organization, disk scheduling, and I/O system operations.

CO5: Compare the architecture and functionality of virtual machines and mobile operating systems like iOS and Android.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts"‖, 10th Edition, John Wiley and Sons Inc., 2018.

2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition, 2022 New Delhi

REFERENCE BOOKS:

1. Ramaz Elmasri, A. Gil Carrick, David Levine, "Operating Systems – A Spiral Approach", Tata McGraw Hill Edition, 2010.

2. William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition, Prentice Hall, 2018.

WEB RESOURCE:

1. https://www.os-book.com/OS10/

2. https://archive.nptel.ac.in/courses/106/105/106105214/

24DBCA81 NEURAL NETWORKS

L	T	P	O	C
3	2	0	2	5

COURSE OBJECTIVES:

- To introduce the fundamental concepts of Neural Networks and their application scope across various fields.
- To explore associative memory models, their training algorithms, and advanced memory networks like Hopfield Networks, Kohonen Self-Organizing Maps, and Adaptive Resonance Theory Networks.
- To provide an understanding of advanced neural networks such as Spiking Neural Networks, Convolutional Neural Networks (CNNs), and Deep Learning architectures.

UNIT I INTRODUCTION 09

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

UNIT II ASSOCIATIVE MEMORY 09

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

UNIT III THIRD-GENERATION NEURAL NETWORKS 09

Spiking Neural Networks-Convolutional Neural Networks-Deep Learning Neural Networks-Extreme Learning Machine Model- Convolutional Neural Networks: The Convolution Operation – Motivation – Pooling – Variants of the basic Convolution Function – Structured Outputs – Data Types

UNIT IV DEEP FEED FORWARD NETWORKS 09

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

UNIT V RECURRENT NEURAL NETWORKS 09

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

Total Hours: 45

COURSE OUTCOMES:

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

CO1: Understand the basic principles of Neural Networks and their applications in real-world problems.

CO2: Train and apply associative memory networks, such as autoassociative, heteroassociative, and Hopfield networks, to solve pattern recognition tasks.

CO3: Implement and apply advanced neural network models like Spiking Neural Networks, Convolutional Neural Networks (CNNs), and understand their applications in deep learning.

CO4: Understand the working of deep feedforward networks, apply regularization techniques like dataset augmentation, dropout, and batch normalization, and address overfitting issues in deep learning.

CO5: Build and deploy recurrent neural networks (RNNs) and their variants for applications like image generation, natural language processing, and compression.

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2016.

2. Francois Chollet, “Deep Learning with Python”, Second Edition, Manning Publications, 2021.

REFERENCE BOOKS:

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

WEB RESOURCE:

1. https://ocw.mit.edu/courses/9-641j-introduction-to-neural-networks-spring-2005/
2. https://nptel.ac.in/courses/117105084

24DBCA82 INTRODUCTION TO DATA SCIENCE

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

- To provide an understanding of data science, its benefits, and the overall process involved in conducting data science research.
- To develop skills for describing and analyzing data using various statistical methods, including measures of central tendency and variability.
- To understand relationships within data through correlation and regression analysis and apply these techniques to real-world datasets.

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

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 – threedimensional plotting - Geographic Data with Basemap - Visualization with Seaborn.

Total Hours: 45

COURSE OUTCOMES:

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

CO1: Explain the process and steps involved in data science, including research goal definition, data retrieval, and building applications.

CO2: Describe data using tables, graphs, averages, and variability measures, and apply statistical techniques to analyze data distributions.

CO3: Understand and apply correlation and regression techniques to describe relationships between variables and calculate key statistical measures such as standard error.

CO4: Utilize Python libraries like Numpy and Pandas for efficient data manipulation, including indexing, handling missing data, and performing aggregations and groupings.

CO5: Create a wide variety of visualizations, including line plots, scatter plots, histograms, and 3D plots using Matplotlib and Seaborn, and visualize geographic data with Basemap.

TEXTBOOKS:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2020. (Unit I)

2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2018. (Units II and III)

3. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2018. (Units IV and V)

REFERENCE BOOKS:

1. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press,2014.

WEB SOURCES:

1. https://nathancarter.github.io/MA346-course-notes/_build/html/chapter-1-intro to-data-science.html2.

2. http://bedford-computing.co.uk/learning/wp content/uploads/2016/09/introducing- data-science-machine-learning-python.pdf

3. https://www.objectivequiz.com/objective-questions/computer-science/datascience

24DBCA82 **NETWORK SECURITY**

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

- To introduce the fundamental concepts of network security, including threats, vulnerabilities, risk management, and securing communication channels.
- To provide an understanding of cryptography and its applications in securing data and communications, including encryption techniques and key management protocols.
- To explore the role of firewalls and Intrusion Detection Systems (IDS) in network security, focusing on their configuration and implementation to protect against unauthorized access and intrusions.

UNIT I: INTRODUCTION TO NETWORK SECURITY 9

Network security involves protecting the integrity, confidentiality, and availability of data and resources as they are transmitted across or accessed through networked systems. Topics include an overview of network security, threats, vulnerabilities, and attacks. The fundamental concepts of risk management, including risk assessment and mitigation strategies, are discussed, along with the importance of securing communication channels.

UNIT II: CRYPTOGRAPHY AND ITS APPLICATIONS 9

Cryptography plays a crucial role in network security by providing mechanisms for securing communications and protecting sensitive information. This unit covers symmetric and asymmetric encryption techniques, cryptographic algorithms like DES, AES, and RSA, as well as key management protocols. Public Key Infrastructure (PKI), digital signatures, and digital certificates are also examined, along with hashing algorithms and their application in maintaining dataintegrity.

UNIT III: FIREWALLS AND INTRUSION DETECTION SYSTEMS (IDS) 9

Firewalls act as a barrier between trusted internal networks and untrusted external networks, controlling incoming and outgoing traffic based on predetermined security rules. This unit explores the different types of firewalls (packet filtering, stateful inspection, proxy firewalls) and their configuration. The concept of Intrusion Detection and Prevention Systems (IDS/IPS) is introduced, focusing on how they detect, log, and mitigate various forms of network intrusions.

UNIT IV: NETWORK ATTACKS AND DEFENSE MECHANISMS 9

Various types of network attacks, including Denial of Service (DoS), Distributed Denial ofService (DDoS), spoofing, phishing, and man-in-the-middle attacks, are covered. The unit discusses methods for preventing these attacks, such as anomaly detection, network segmentation,and the implementation of strong network authentication protocols. The role of encryption and multi-factor authentication in securing network access is also addressed.

UNIT V: WIRELESS NETWORK SECURITY AND VPN 9

Wireless networks pose unique security challenges due to their broadcast nature. This unit focuses on the security risks associated with Wi-Fi networks and the various standards designed to protect them, such as WEP, WPA, and WPA2. Virtual Private Networks (VPNs), which secure communication over potentially insecure networks like the internet, are explored in detail. The unit includes a discussion on the types of VPNs (IPSec, SSL) and how they function to secure remote access and data transmission.

Total Hourrs 45

COURSE OUTCOMES :

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

CO1: Describe the fundamental concepts of network security, including risks, threats, vulnerabilities, and the importance of securing communication channels.

CO2: Explain various cryptographic techniques, including symmetric and asymmetric encryption, digital signatures, hashing algorithms, and key management protocols, and their role in securing communications.

CO3: Identify and configure different types of firewalls (packet filtering, stateful inspection, proxy firewalls) and describe the role of IDS/IPS in detecting and mitigating network intrusions.

CO4: Analyze different types of network attacks (e.g., DoS, DDoS, phishing) and explain the corresponding defense mechanisms, such as anomaly detection, network segmentation, encryption, and multi-factor authentication.

CO5: Understand the security risks associated with wireless networks and VPNs, including the use of standards like WPA, WPA2, and VPN protocols (IPSec, SSL) to secure communication and remote access.

TEXT BOOKS:

1. "Practical Network Security: A Hands-On Approach" by J. C. Knight and R. S. Yadav (2020)
2. "Network Security Essentials: Applications and Standards" by William Stallings (7th Edition, 2017)
3. "Cryptography and Network Security: Principles and Practice" by William Stallings (7th Edition, 2016)
4. "Network Security Bible" by Eric Cole (2009)

REFERENCE BOOKS:

1. "Computer Networking: A Top-Down Approach" by James Kurose and Keith Ross (7th Edition, 2017)
2. "Security+ Guide to Network Security Fundamentals" by Mark Ciampa (6th Edition, 2017)
3. "The Basics of Hacking and Penetration Testing" by Patrick Engebretson (2011)
4. "Hacking: The Art of Exploitation" by Jon Erickson (2nd Edition, 2008)

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3. https://en.wikipedia.org
4. Www.geeksforgeeks.org
5. www.investopedia.com
6. www.guru99.com

24DBCA83 **TIME SERIES ANALYSIS**

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

- To introduce real-life examples of time series data and the various types of variations (e.g., trend, seasonality, and randomness) observed in such data.
- To explore methods of smoothing and forecasting, including exponential smoothing, moving average smoothing, and the Holt-Winters method, for time series data.
- To understand and apply various time series models such as AR, MA, and ARMA, and to study the concepts of stationarity and invertibility.

UNIT-1 **09**

Real life examples of time series, types of variation in time series, exploratory time seriesanalysis, tests of randomness, tests for trend, seasonality. Auto-covariance and auto-correlation functions and their properties.

UNIT-II **09**

Exponential and Moving average smoothing. Holt -Winters smoothing. Forecasting based on smoothing, adaptive smoothing. Time - series as a discrete parameter stochastic process. Portmanteau tests for noise sequence.

UNIT-III **09**

Transformation to obtain Gaussian series. General linear processes. Auto regressive (AR), Moving average (MA) and Autoregressive moving average (ARMA), Stationarity and invertibility conditions.

UNIT-IV **09**

Nonstationary and seasonal time series models: Auto regressive integrated moving average (ARIMA) models, Seasonal ARIMA (SARIMA) models, Transfer function models (Time series regression). Estimation of mean, auto covariance and autocorrelation functions.

UNIT-V **09**

Yule-Walker estimation. Forecasting in time series models, Durbin-Levinson algorithm,innovation algorithm. Estimation of ARIMA model parameters, Choice of AR and MA periods.

Total Hours 45

COURSE OUTCOMES:

CO1: Understand the foundational theory of linear time series models, including estimation and forecasting techniques.

CO2: Demonstrate knowledge of stationarity concepts in time series analysis, identifying stationary and non-stationary series.

CO3: Apply ARCH and GARCH models to analyze and model time series data with volatility clustering.

CO4: Use information criteria (e.g., AIC, BIC) effectively for model selection to optimize time series forecasting accuracy.

CO5: Conduct exploratory analysis on time series data, identifying patterns, trends, and seasonal variations.

CO6: Solve practical problems in time series analysis, employing suitable models and methods to interpret and forecast real-world data.

TEXT BOOKS:

1. "Introduction to Time Series and Forecasting" by Peter J. Brockwell and Richard A. Davis (2020, 3rd Edition)
2. "Time Series: A Data Analysis Approach Using R" by Robert H. Shumway and David S. Stoffer (2021)
3. "The Analysis of Time Series: An Introduction" by Chris Chatfield (2021, 7th Edition)

REFERENCE BOOKS:

1. Chatfield, C. (2001): Time Series Forecasting, Chapman &Hall.
2. Lutkepohl, H. (2005): New Introduction to Multiple Time Series Analysis, Springer
3. Shumway, R. H. and Stoffer, D. S. (2010): Time Series Analysis & Its Applications, Springer.

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3. https://en.wikipedia.org
4. Www.geeksforgeeks.org
5. www.investopedia.com
6. www.guru99.com



24DBCA83 FULL STACK WEB DEVELOPMENT

L	T	P	O	C
3	1	0	2	4

COURSE OBJECTIVES:

- To introduce the fundamental concepts of full-stack web development, including understanding the roles of different components (user, browser, webserver, backend services) and the MVC architecture.
- To provide a hands-on understanding of Node.js, including installation, usage of Node packages, event-driven programming, and implementing HTTP services.
- To explore MongoDB, its NoSQL structure, and how to interact with it from Node.js for effective data storage and retrieval.

UNIT I BASICS OF FULL STACK 9

Understanding the Basic Web Development Framework - User - Browser – Webserver - Backend Services – MVC Architecture - Understanding the different stacks –The role of Express – Angular – Node – Mongo DB – React

UNIT II NODE JS 9

Basics of Node JS – Installation – Working with Node packages – Using Node package manager – Creating a simple Node.js application – Using Events – Listeners –Timers - Callbacks –Handling Data I/O – Implementing HTTP services in Node.js

UNIT III MONGO DB 9

Understanding NoSQL and MongoDB – Building MongoDB Environment – User accounts – Access control – Administering databases – Managing collections – Connecting to MongoDB from Node.js – simple applications

UNIT IV EXPRESS AND ANGULAR 9

Implementing Express in Node.js - Configuring routes - Using Request and Response objects - Angular - Typescript - Angular Components - Expressions - Data binding - Built-in directi

UNIT V REACT 9

MERN STACK – Basic React applications – React Components – React State – Express REST APIs - Modularization and Webpack - Routing with React Router – Server-side rendering

Total Hours 45

COURSE OUTCOMES:

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

- **CO1:** Understand the architecture and basic components involved in a full-stack web application, including MVC architecture, Express, Angular, Node.js, MongoDB, and React.
- **CO2:** Install and configure Node.js, use Node package manager (NPM), create basic Node.js applications, and handle I/O operations, events, and HTTP services.
- **CO3:** Design and implement MongoDB databases, manage collections, and interact with MongoDB using Node.js to develop efficient data-driven applications.
- **CO4:** Develop backend services using Express.js in a Node.js environment, configure routes, and use the request and response objects for creating web services.
- **CO5:** Develop frontend applications with Angular, using TypeScript and Angular components, directives, and data-binding techniques for dynamic interfaces.

TEXT BOOKS:

1. Brad Dayley, Brendan Dayley, Caleb Dayley, 'Node.js, MongoDB and Angular WebDevelopment', Addison-Wesley, Second Edition, 2018

2. Vasan Subramanian, 'Pro MERN Stack, Full Stack Web App Development with Mongo,Express, React, and Node', Second Edition, Apress, 2019.

REFERENCE BOOKS:

1. Chris Northwood, 'The Full Stack Developer: Your Essential Guide to the Everyday SkillsExpected of a Modern Full Stack Web Developer', Apress; 1st edition, 2018

2. Kirupa Chinnathambi, 'Learning React: A Hands-On Guide to Building Web ApplicationsUsing React and Redux', Addison-Wesley Professional, 2nd edition, 2018

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1. www.w3schools.com
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4. www.geeksforgeeks.org
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