Francis Xavier Engineering College, .Dept of AI& DS/R2024/Curriculum and Syllabi/ VIII Board of Studies

Francis Xavier Engineering College (AnAutonomousInstitution)

Tirunelveli627003

TamilNadu,India

Department of Artificial Intelligence and Data Science



Curriculum and Syllabi–R2024-UG

CHOICE BASED CREDIT SYSTEM AND OBE

8th Board of Studies Vision of the Department

To impart quality education and produce high quality, creative and ethical engineers, in still professionalism, enhance students' problem-solving skills in the domain of artificial intelligence and data science with a focus to prepare them for the industry, engage them in potential research areas, to pursue and have continued professional growth to serve the greater cause of society.

Mission of the Department

To provide skill- based education to master the students in problem Solving and analytical skills to enhance their expertise in the field Artificial Intelligence and Data Science. To educate the students with latest technologies to update their knowledge in the field of AI and Data science. To enable Students to experience content based learning with premier quality data science Education, research, industrial collaboration and to become a successful entrepreneur recognized globally

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Programme Educational Objectives (PEOs)

- **PEO1** To Formulate, analyze and solve Engineering problems with strong foundation in Mathematical, Scientific, Engineering fundamentals and modern computing Practices through advanced curriculum.
- **PEO2** Analyze the requirements, realize the technical specification and design the Engineering solutions by applying Artificial Intelligence and Data Science theory and principles.
- **PEO3** Demonstrate technical skills, competency in AI and DS and promote collaborative learning and teamwork spirit through multi-disciplinary projects and diverse professional activities.
- **PEO4** Equip the graduates with strong knowledge, competence and soft skills that allows them to contribute ethically to the needs of society and accomplish sustainable progress in the emerging computing technologies through life-long learning.

Programme Specific Outcomes (PSOs)

- **PSO1** Implement Artificial Intelligence and data science techniques such as search algorithms, neural networks, machine learning and data analytics for solving a problem and designing novell algorithms for successful career.
- **PSO2** Apply the skills in the areas of healthcare, education, agriculture, intelligent transport, environment, smart systems and in the multi-disciplinary area of Artificial Intelligence And Data Science.
- **PSO3** Graduates will acquire practical competency with emerging technologies and open Source platforms related to areas of Artificial Intelligence and Data Science to become a successful Entrepreneur.

Programme Outcomes (POs)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate

consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

8. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

9. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

10. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one"s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

11. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping with PO Vs PEO, PSO

PEO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO 10	PO 11	PS0 1	PSO 2	PSO 3
PEO 1	3	3	3	3	3	3	2	2	1	1	2	3	3	2
PEO 2	3	3	3	3	3	1	2	1	2	2	2	3	3	2
PEO 3	3	3	3	3	3	3	3	3	3	3	3	1	1	2
PEO 4	2	2	2	2	2	3	3	3	3	3	2			3

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

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

PROGRAMME		PROGRAMME OUTCOMES (POs)											
OBJECTIVES (PEO)	P01	PO2	P03	P04	PO5	P06	P07	P08	P09	P010	P011		
PEO 1	3	3	3	3	3	3	2	2	1	1	2		
PEO 2	3	3	3	3	3	1	2	1	2	2	2		
PEO 3	3	3	3	3	3	3	3	3	3	3	3		
PEO 4	2	2	2	2	2	3	3	3	3	3	2		

 $1 \rightarrow Low 2 \rightarrow Medium 3 \rightarrow High$

MAPPING OF PROGRAMME SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Outcomes and the Programme outcomes is given in the following Table

PROGRAMME SPECIFIC				PROC	GRAM	AE OU'	тсом	ES (PO	s)		
OBJECTIVES (PSO)	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011
PSO 1	3	3	2	1	1	1	2		1	2	2
PSO 2	3	3	2		1	1				2	2
PSO 3	3	3	2	1	1	1			1	1	2

 $1 \rightarrow Low 2 \rightarrow Medium 3 \rightarrow High$

B.TECH.–Artificial Intelligence and Data Science

REGULATION 2024

Choice Based Credit System and Outcome Based Education Summary of Credit Distribution

		Credits Per Semester						TotalCr	Credits		
S. No	Category	Ι	II	III	IV	V	VI	VII	VIII	edits	in %
1	HSSM	4	3		2			3		12	7.36
2	BS	10	4	4	4					22	13.50
3	ES	7	12	3						22	13.50
4	РС		2	11	14	14	11	5		57	34.97
5	PE					6	6	6		18	11.04
6	OE			3	3	3	3			12	7.36
7	EEC		1	1	2	2	3	2	9	20	12.27
	Total	21	22	22	25	25	23	16	9	163	100

Minimum Number of Credits to be acquired: 163 Lateral Entry Credits:120

HSSM - Humanities and Social Sciences including Management BS-BasicScience ES - Engineering Sciences PC-ProfessionalCore PE-ProfessionalElective OE - Open Elective/Programme Specific Elective for Expandable Scope EEC-EmployabilityEnhancement Course

B.TECH.–Artificial Intelligence and Data Science REGULATION 2024 Choice Based Credit System and Outcome Based Education I-VIII Semester Curricula and Syllabi SEMESTER I

S.	Course		_	Contact	_									
No	Code	Course Name	Category	Periods	L	Т	Р	С						
	Theory courses													
1	24MA1202	Linear Algebra and Calculus	BS	4	3	1	0	4						
2	24PH1301	Applied Physics	BS	2	2	0	0	2						
3	24CY1401	Applied Chemistry	BS	2	2	0	0	2						
4	24CS1501	Introduction To Programming With C	ES	3	3	0	0	3						
5	24HS1103	Tamil Heritage /தமிழர்மரபு	HSSM	2	1	0	0	1						
		Theory cum Practical C	lourses											
1	24HS1101	Professional Communication Skills	HSSM	4	2	0	2	3						
		Practical Courses	S											
1	24PC1311	Applied Physics and Chemistry Laboratory	BS	4	0	0	4	2						
2	24CS1511	Programming Practice Laboratory using C	ES	4	0	0	4	2						
3	24GE1511	Engineering Practices Laboratory	ES	4	0	0	4	2						
		Total		29	14	1	14	21						

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SEMESTERII

S. No	Course Code	Course Name	Category	Conduct Periods	L	Р	Т	С
		Theory Course	es				•	
1	24HS2101	Technical Communication Skills	HSSM	2	2	0	0	2
2	24MA2201	Complex Analysis and Fourier Series	BS	4	3	1	0	4
3	24CS2501	Introduction to Computing using Python	ES	3	3	0	0	3
4	24EE2501	Fundamentals of Electrical and Electronics Engineering	ES	3	3	0	0	3
5	24ME1501	Engineering Graphics	ES	4	2	0	4	4
6	24GE2901	Design Thinking	EEC	1	1	0	0	1
7	24HS2103	Technology in Tamil Culture/ தமிழரும்தொழில்நுட்பமும்	HSSM	1	1	0	0	1
		Practical Cours	ses					
1	24CS2511	Python Programming Laboratory	ES	4	0	0	4	2
2	24AI2611	Artificial Intelligence Tools Laboratory	PC	4	0	0	4	2
			Total	25	15	1	12	22

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S.	Cour	Course Name	Catego	Conta	L	Т	Р	С				
Ν	se		ry	ctPer								
0	Cod			iods								
	e											
		Theory Cou	rses									
124MA3201Mathematics for Data ScienceBS33104												
2	24IT3501	Digital Principles and System Design	ES	3	3	0	0	3				
3	24AI3601	Data Structures and Algorithm Analysis	PC	3	3	0	0	3				
4	24AI3602	Data Science Using python	PC	3	3	1	0	4				
5		Open Elective-I	OE	3	3	0	0	3				
		Practical Cou	irses			1						
1	24AI3611	Data Structures and Algorithm Analysis Lab	PC	4	0	0	4	2				
2	24AI3612	Data Science lab	PC	4	0	0	4	2				
3	24PT3902	Soft Skills-Verbal Ability	EEC	2	0	0	2	1				
			Total	25	15	2	10	22				

SEMESTER III

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S. N	Course Code		Course Name	Category	Contac Periods	s L	Т	Р	С
0									
			Theory Cou	rses					
1	0.4110.410.1			110014	2	2	0	0	2
1	24HS4101	Prof valu	essional Ethics and Human es	HSSM	2	2	0	0	2
2	24MA420 1	Disc	crete Mathematics	BS	3	3	1	0	4
3	24AI4601	Data	a Analytics	PC	3	3	1	0	4
4	24AI4602	Arti Syst	ficial Intelligence and Expert ems	PC	3	3	0	0	3
5		Ope	n Elective- II	OE	3	3	0	0	3
			Theory Cum practic	al Courses					
1	24IT4603	Ope	rating Systems	PC	4	2	0	2	3
			Practical Cou	irses					
1	24AI4611	Data	Analytics laboratory	PC	4	0	0	4	2
2	24AI4612	Arti	ficial Intelligence lab	PC	4	0	0	4	2
3	24PT3901	Soft	Skills–Aptitude1	EEC	2	0	0	2	1
4	24GE4911	Des	ign Thinking Project	EEC	1	0	0	2	1
			Total		30	16	2	14	25

SEMESTER IV

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S.N O	CourseCo de	CourseName	Category	Conta ctPer iods	L	T	Р	C
		TheoryCourse	es		1		•	
1	24AI5601	Database& Data Warehousing	PC	3	3	0	0	3
2	24AI5602	Machine Learning	PC	3	3	1	0	4
3		Professional Elective–I	PE	3	3	0	0	3
4		Professional Elective–II	PE	3	3	0	0	3
5		Open Elective III	OE	3	3	0	0	3
	1	TheorycumPractical	Courses					
1	24AI5603	Java Programming and Embedded SQL	PC	5	2	0	2	3
		PracticalCours	ses		•			
1	24AI5611	Database & Data Warehousing Laboratory	PC	4	0	0	4	2
2	24AI5612	Machine Learning Lab	PC	4	0	0	4	2
3	24PT4901	Soft Skills–Aptitude-II	EEC	1	0	0	2	1
4	24HS5911	Communication and Soft Skills Laboratory	EEC	1	0	0	2	1
		Total		31	17	1	14	25

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S. No	Course Code	CourseName	Category	Contact Periods	L	Τ	Р	С
		TheoryCourse	es			L		
1	24AI6601	Deep Learning for computer vision	PC	3	3	0	0	3
2	24AI6602	Automata Theory and Formal Languages	PC	3	3	0	0	3
2		Open Elective–IV	OE	3	3	0	0	3
3		Professional Elective –III	PE	3	3	0	0	3
4		Professional Elective–IV	PE	3	3	0	0	3
5	24GE6M01	Environmental and Sustainable Engineering	MC	2	2	0	0	0
		Theory cum Pract	ical					
1	24AI6601	Big Data Analytics	PC	5	2	0	2	3
		PracticalCours	es		•	•		
1	24AI6611	Deep Learning Lab	PC	4	0	0	4	2
2	24PT4902	Soft Skills –Reasoning	EEC	2	0	0	2	1
3	24AI6911	Internship	EEC	4	0	0	4	2
	*	Total		32	19	0	12	23

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S	Course	Course Name	Categor	Conta	L	Τ	Р	С
•	Code		У	ct				
Ν				Perio				
0				ds				
		Theory Cou	rses					
1	24HS7101	Principles of Quality and	HSSM	3	3	0	0	3
		Management						
2	24AI7601	NLP and Prompt Engineering	PC	3	3	0	0	3
3		Professional Elective–V	PE	3	3	0	0	3
4		Professional Elective–VI	PE	3	3	0	0	3
		Practical Con	urses					
1	24AI7611	NLP Laboratory	PC	4	0	0	4	2
2	24AI7911	Creative and Innovative Project	EEC	4	0	0	4	2
		Total		20	12	0	8	16

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SEMESTERVIII

S.N O	Course Code	CourseName	Contact Periods	L	Т	Р	C	
Practi	calCourses							
1	24AI8911	Project Work Phase-II	EEC	20	0	0	18	9
			Total	20	0	0	18	9

Minimum number of Credits to be acquired: 163

S. N O	CourseCo de	CourseName	Se mes ter	L	Т	Р	C	Stream/Domain				
		Professional E	lective I				1					
1.	24AI5701	AI Ethics	5	3	0	0	3	Advanced Artificial Intelligence				
2.	24AI5702	Cognitive Science and Analytics	5	3	0	0	3	Data Analytics				
3.	24AI5703	Pattern Recognition	5	3	0	0	3	Machine Learning				
4.	24AI5704	AI Enhanced Software Engineering	5	3	0	0	3	Software Engineering				
5.	24AI5705	Robotic Process Automation	5	3	0	0	3	Robotics				
Professional Elective II												
1.	24AI5706	Artificial Neural Networks	5	3	0	0	3	Advanced Artificial Intelligence				
2.	24AI5707	Text Analytics	5	3	0	0	3	Data Analytics				
3.	24AI5708	Sentimental Analysis	5	3	0	0	3	Machine Learning				
4.	24AI5709	Software Project Management	5	3	0	0	3	Software Engineering				
5.	24AI5710	Robotic OS and Robot simulation Engineering	5	3	0	0	3	Robotics				
		Professional Elective III										
1.	24AI6701	AI in Cyber Security	6	3	0	0	3	Advanced Artificial Intelligence				
2.	24AI6702	Big data management	6	3	0	0	3	Data Analytics				
3.	24AI6703	Machine Learning Operating Systems	6	3	0	0	3	Machine Learning				
4.	24AI6704	Software testing and Automation	6	3	0	0	3	Software Engineering				
5.	24AI6705	Full Stack Application Development	6	3	0	0	3	Robotics				

List of Professional Electives Courses

		ProfessionalElectiveIV						
1.	24AI6706	Reinforcement and Ensemble learning	6	3	0	0	3	Advanced Artificial Intelligence
2.	24AI6707	Recommendation Systems	6	3	0	0	3	Data Analytics
3.	24AI6708	Scalable Machine Learning	6	3	0	0	3	Machine Learning
4.	24AI6709	Dev Ops	6	3	0	0	3	Software Engineering
5.	24AI6710	Multi-Agent Systems	6	3	0	0	3	Robotics
	I	ProfessionalElectiveV			I			
1.	24AI7701	Distributed AI	7	3	0	0	3	Advanced Artificial Intelligence
2.	24AI7702	Video Analytics	7	3	0	0	3	Data Analytics
3.	24AI7703	Decision Support Systems	7	3	0	0	3	Machine Learning
4.	24AI7704	Software Risk Management and Maintenance	7	3	0	0	3	Software Engineering
5.	24AI7705	Autonomous Systems	7	3	0	0	3	Robotics
		ProfessionalElectiveVI			I		•	
1.	24AI7706	Advanced Artificial Intelligence	7	3	0	0	3	Advanced Artificial Intelligence
2.	24AI7707	Knowledge Engineering	7	3	0	0	3	Data Analytics
3.	24AI7708	Advanced ML Techniques	7	3	0	0	3	Machine Learning
4	24AI7709	Agile Software Methodologies	7	3	0	0	3	Software Engineering
5	24AI7710	Tele Robotics and Virtual Reality	7	3	0	0	3	Robotics

S.	Course	Course Name	Sem	L	Т	Р	С				
Ν	Code										
0											
OPEN	ELECTIVE-I										
1	24AI3801	Introduction to Machine Learning	Introduction to Machine330Learning330								
2	24AI3802	AI in cyber security	3	3	0	0	3				
3	24AI3803	Advancements in AI	3	3	0	0	3				
4	24AI3804	Data Exploration Using Python	3	3	0	0	3				
5	24AI3805	Data science essentials	3	3	0	0	3				
OPEN	ELECTIVE-II					<u> </u>					
1	24AI4801	Principles of Deep Learning	4	3	0	0	3				
2	24AI4802	AI and Robotics	4	3	0	0	3				
3	24AI4803	Time series Forecasting	4	3	0	0	3				
4	24AI4804	Generative AI	4	3	0	0	3				
5	24AI4805	Front end Development with AI frameworks	4	3	0	0	3				

List of Open Elective Courses Offered to Departments-ECE, Mech, Civil &EEE

OPEN	ELECTIVE-III								
1	24AI5801	Intelligent Automation	5	3	0	0	3		
2	24AI5802	AI tools for Engineers	5	3	0	0	3		
3	24AI5803	Predictive Engineering Analytics	gineering Analytics 5 3 0 0						
4	24AI5804	Computer vision	5	3	0	0	3		
5	24AI5805	Data Visualization and Dashboarding	5	3		0	3		
OPEN	ELECTIVE-IV								
1	24AI6801	AI Driven Software Testing	6	3	0	0	3		
2	24AI6802	AI based Control Systems	6	3	0	0	3		
3	24AI6803	AI for Engineering decisions	6	3	0	0	3		
4	24AI6804	AI in Health Care	6	3	0	0	3		
5	24AI6805	Data Analytics Tools and Techniques	6	3	0	0	3		

List of Minor Courses

Sl.No	Course	Course Name	Sem	L	Т	Р	С	Offered By
	Code							
1.	24AI4S01	Business Intelligence Tools	4	2	0	2	3	AI&DS
2.	24AI5S01	Business Analytics with R	5	2	0	2	3	AI&DS
3.	24AI6S01	Augmented Analytics	6	3	0	0	3	AI&DS
4.	24AI7S01	AI Powered Decision Intelligence	7	3	0	0	3	AI&DS
5.	24AI8S01	Project Work	8	0	0	0	4	AI&DS

List of skill Based Value Added Courses

Sl.	Semester	Course Name
No		
1.	Ι	Foundation Skill
2.	II	Web Interface Development
3.	III	Problem Solving using Python
4.	IV	Analytics with Power BI and Tableau
5.	V	ML model deployment using Python
6.	VI	Placement Training - Six Phrase or Connect

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SEMESTER I

c	Course		Catagor	Cont				
5.	course	Course Name	Categor	act	L	Т	Р	С
No	Code		У	Peri				
				ods				
	I	Theory Courses			1			
1	24ME1202	Linear Algebra and Calculus	BS	4	3	1	0	4
2	24PH1301	Applied Physics	2	2	0	0	2	
3	24CY1401	Applied Chemistry	BS	2	2	0	0	2
4	24CS1501	Introduction To Programming With C	3	3	0	0	3	
5	24HS1103	Tamil Heritage /	2	2	0	0	1	
		Theory cum Practical Cou	rses					
1	24HS1101	Professional Communication Skills	HSSM	4	2	0	2	3
		Practical Courses						
1	24PC1311	Applied Physics and Chemistry	BS	4	0	0	4	2
		Laboratory						
2	24CS1511	Programming Practice Laboratory	ES	4	0	0	4	2
3	24GE1511	Engineering Practices Laboratory	ES	4	0	0	4	2
		29	14	1	1	2		
				-	4	1		

				1					
24MA1202	LINEAR ALGEBRA AND CALCULUS	L	T	P					
D		3	1	0					
The course consists spaces with applic topics: Cayley Ha and dimensions, I coefficients, Methor For two variables.	sts of topics in Matrices, Differential calculus, Differential Equa cations to various engineering problems. This course will cover the milton Theorem, Vector spaces, Linear independence and linear d Linear transformation, Linear differential equations of second or odsofVariationparameter, Taylor's expansion of two variables, Maxima	tions a le follow lepende der with aandMin	nd Vec wing m nce Ba n const nima	tor ain ses ant					
Prerequisites for	the course:								
Students should have	ave basic knowledge about Matrices, Group theory and Differentiat	ion.							
Objectives									
 To apply a To reduce To Unders To familia To familia 	 To apply advanced matrix knowledge to Engineering problems. To reduce the given matrix into canonical form and to decompose the given matrix To Understand the concepts of subspaces, bases, dimension and Linear Transformation. To familiarize with the applications of differential equations. To familiarize with the functions of several variables 								
UNIT I	MATRICES		9+3						
Introduction- Type values and Eigen Hamilton Theorem – Applic	Introduction- Types of matrices-Matrix operations–Power of a Matrix – Rank of a matrix – Eigen values and Eigen vectors of a matrix–Properties of Eigen values and Eigen vectors of a matrix-Cayley Hamilton Theorem – Applications of Cayley Hamilton theorem.								
UNIT II	DIAGONALIZATION AND QUADRATIC FORMS		9+3						
Diagonalization of a matrix by similarity transformation- Diagonalization of a matrix by orthogonal transformation - Quadratic forms - Reduction of Quadratic form to canonical form -LU decomposition – Problems.									
UNIT III	VECTOR SPACES AND LINEAR TRANSFORMATION		9+3						

Vector spaces — Subspaces —	- Linear combinations and linear syst	em of equations — Linear
independence and linear depend	ence — Bases and dimensions – Linea	r transformation-Algebra of
Inear transformations-Isomorphis	sm-Representation of transformations	
By Matrices – Inverse of a linear t		
UNIT IV	ORDINARY DIFFERENTIAL EQUA	TIONS 9+3
Differential Equations - Linear equations exponential, trigonometry, polyno Linear equations Of second order with variable coe	quations of second order with constant co omial and its combination forms-Methods efficients(Cauchy–Euler type)	efficients of types s of Variation parameter-
UNIT V	MULTIVARIABLE CALCULUS	9+3
Suggestive Assessment Methods	5	Total Periods 45+15=6 0 Periods
Continuous Assessment Test	Ecomotive Assessment Test	End Somester Evons
(20 Marks)	(20 Marks)	(60 Marks)
1.DescriptiveQuestions	1. Assignment 2. Online Quizzes	1.Descriptive Questions
Outcomes		
Upon completion of the course, the	he students will be able to:	
CO1:Find the eigen values, eigen CO2:Solve Linear Equations by I CO3:Apply the concept of vector CO4:Identify the suitable method CO5:Find the maxima and minim stationary points (Apply)	vectors, inverse and the positive powers LU decomposition which is used in Image spaces and Linear transformations in rea to solve second and higher order differen- a for a given function with several variab	of a square matrix.(Apply) e processing.(Apply) l life problems(Apply) ntial equations (Apply) bles, through by finding
Text Books		
 Margalit and Rabinoff, In David C. Lay, Linear Alg B. S. Grewal, "Higher En 	teractive Linear Algebra, Georgia Institue ebra and its applications, Global Edition, gineering Mathematics",43 rd edition, 2017	te of Technology. 6 th Edition, 2021. 7.

Reference Books

- 1. N. P. Bali, Dr. Manish Goyal, A Text book of Engineering Mathematics, University Science Press, 9th Edition, 2016.
- 2. K.Ganesan,SundarammalKesavan,K.S.GanapathySubramanian&V.Srinivasan,"Calculusa nd Solid Geometry", Revised Edition, 2017

Web Resources

- 1. https://www.udemy.com/topic/linear-algebra
- 2. https://www.edx.org/course/introduction-to-linear-models-and-matrix-algebra
- 3. https://www.deeplearningbook.org/contents/linear_algebra.html
- 4. https://onlinecourses.nptel.ac.in/noc23_ma88/preview

CO Vs PO Mapping and CO Vs PSO Mapping:

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1	3	3										1		
2	3	3										1		
3	1	3										1		
4	3	3		1								1		
5	3	2		1								1		

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1(CO1): (Apply)

1) Three Football players Messi, Ronaldo and Neymar are throwing a ball to each other. Messi, throws the ball to himself by two times, to Neymar one time and never throws to Ronaldo. Ronaldo throws the ball to himself by two times and never throws the ball to Messi and Neymar. Neymar throws the ball to Messi one time and to himself by two times and he never the balls to Ronaldo.

i)Write down the matrix of the above problem

ii) In the characteristic equation $\lambda^3 - S_1 \lambda^2 + S_2 \lambda - S_3 = 0$. what is S_2 ?

iii) what is **S**₃?

iv)Write down the characteristic equation

v)Find its eigen value

vi)Find the eigen vectors.

2)A salesperson has the following record of sales for the month of June, July and August 2023 for

	Sales in Units							
Months	А	В	С					
June	2	2	1					
July	1	3	1					

three products A, B, and C.

	August	1	2	2						
i)Write down the matrix of the above problem ii) In the characteristic equation $\lambda^3 - S_1\lambda^2 + S_2\lambda - S_3 = 0$ what is S_1 ? iii) what is S_2 ? iv) what is S_3 ? v)Write down the characteristic equation vi)Verify Cayley Hamilton theorem for the above situation vii) Find the inverse of the above matrix.										
COURSE OUTCOME 2(CO2): (Apply) 1) Reduce the Quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to the canonical form										
and specify the matrix of transformation.										
2) Reduce the Qua	dratic form <mark>6</mark> x	$^{2} + 3y^{2} + 3z$	$x^2 - 4xy - 2yz$	x + 4xz into th	e canonical					
form by orthogonal	reduction.									
COURSE OUTCOM	E 3(CO3): (Ap	oply)								
1) For each of the f	following list o	f vectors in R3	3.Determine w	hether						
the first vector can b	beexpressed as	a linear comb	oination of the	other two						
(i) (-2,0,3),(1,3,0),(2,4,-1)									
(ii) (3,4,1),(1,-2,1),	(-2,-1,1).									
2) Find the matrix	[T]e whose lir	lear operator	T(x,y) = (5x -	+ y, 3x - 2y).						
COURSE OUTCOM	E 4(CO4): (Ap	ply)								
1) Consider the i) The ord	differential eq ler and degree	uation y'' - 3y of the above o	' + 4y = 4 and a differential equ	answer the foll ation is &	owing &					
ii) The aux	ciliary equation	n of the above	ODE is							
iii) The roo	ots of the auxili	ary equations	are							
iv) The con	nplementary f	unction of the	above ODE is							
v) The par	ticular integra	ıl is								
2) Solve by method of	f variation of p	arameters <mark>(D</mark> 2	$(+4)y = tan^2$	<i>x</i> .						
COURSE OUTCOME 5	5(CO5): (Appl	y)								

1) Expand the given power signal $f(x, y) = e^x \log(1 + y)$ as a Taylor's series in the powers of x

and y up to the third degree terms.

2) If the radiation of the particle is $u = \sin^{-1}(\frac{x^3 - y^3}{x + y})$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 2 \tan u$.

Using Euler's theorem.

NPTEL/SWAYAM Course:

S. No.	NPTEL Course Name	Instructor	Host Institute
1.	Engineering Mathematics – I	Prof. Jitendra Kumar	IIT Kharagpur

Prepared by Mrs. A. Reshiya, AP/Maths Verified by Mr. A. Santiago Stephen, Asso. Prof/ Maths Francis Xavier Engineering College/ Dept of AI& DS/R2024/Curriculum and Syllabi/VIII Board of Studies

04014004	APPLIED PHYSICS	L	T	P	С
24PH1301	(Common to All Branches)	2	0	0	2
Preamble					
The aim of this which are essen basic principles	course is to impart fundamental knowledge in materials a ntial in understanding and explaining engineering devices.It of physics to the development of various engineering fields.	nd relate encompa	ed basic sses the	physical applicati	concep on of th
Prerequisites	s for the course				
Nil					
Objectives					
 semicor To foste for nane To intro building To prov condition To impact 	aductor devices. er an idea on the significance of nanostructures, quantum co o device applications and quantum computing. oduce the fundamentals of heat transfer through various mat gs, and diverse thermal applications. ride comprehensive knowledge on the principles and practioning. art knowledge on the study of various sensors.	onfineme rerials, th ces of bu	ent, and the therman and the therman and the therman and the therman and the	their imp al perfor entilation	blication mance o n and a
UNIT I	OPTOELECTRONIC DEVICES			6	
Introduction to transistors - So diodes.	semiconductors - direct and indirect band gap – p-n junct purces: Solar cell - Light Emitting Diode (LED) - Organic Lig	ion – Tra ght Emitt	ansistor ting Dioc	- p-n-p a le (OLED	nd n-p)) - Las
UNIT II	NANODEVICES AND QUANTUM COMPUTING			6	
Introduction - nanomaterials automata - Qua qubits –CNOT g	quantum confinement – quantum structures: quantum we - Tunneling – Single electron phenomena and single elect antum system for information processing - quantum states ate - advantage and applications of quantum computing.	lls, wire ron tran – classic	s and do sistor – cal bits –	ts – ban quantun quantui	nd gap n cellul m bits o
UNIT III	THERMAL APPLICATIONS			6	
Introduction - bimetallic strip fenestrations, t thermal perform	Principles of heat transfer - thermal expansion of solids s - thermal conductivity – Lee's disc method: theory and e hermal insulation and its benefits - heat gain and heat loss nance of buildings - thermal measurements, thermal comfort	and liqu xperimen estimat	uids – e: nt - heat tion - fac	xpansion transfer tors affe	joints throug cting th
UNIT IV	VENTILATION AND REFRIGERATION			6	
		 Vontil	lation M		
Introduction – conditioner - w different types	Ventilation - Requirements, principles of natural ventilation vindow air conditioner - chilled water plant - fan coil syste of buildings - Protection against fire to be caused by A.C. Syste	ms - Air ems	· conditio	easureme oning sys	ents - A stems fo

Introduction to sensor - Hall effect sensor - SQUID sensor – Gas sensor – Medical sensor - Ultrasonic sensor Fiber Optic sensor- Temperature and displacement sensors - liquid level sensing - Fluid flow sensing microbend Sensors.

		Total Peri	Total Periods							
Suggest	tive Assessment Meth	ods	i							
Conti	nuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)							
	Descriptive	Assignment Online Quizzes Problem-Solving Activities		Descriptive						
Outcom	ies									
Upon co	ompletion of the cour	se, the students will be able to :								
CO 1	Apply the knowledge systems. Apply	e of semiconductor devices to desi	gn ar	nd optimize practical electron						
CO 2	Understand the basic computing. Underst	Understand the basics of quantum structures and their applications and basics of quantum computing. Understand								
CO 3	Acquire the knowled performance of build	Acquire the knowledge about heat transfer through different materials, thermal performance of building and thermal insulation. Understand								
CO 4	Acquire the under Understand	standing of building ventilation	n an	d air conditioning system						
CO 5	Apply the knowledg real-world application	e of sensor technologies to design ons. Apply	and	implement sensor systems fo						
Text Bo	oks									
1. S.O. H 2011	Kasap. Principles of Ele 	ctronic Materials and Devices, McG	raw-l	Hill Education (Indian Edition						
2. Thom 3. Parag Editi	nas L. Floyd, Electronic De g K. Lala, Quantum Co on), 2020.	evices, Pearson India Education Servic omputing: A Beginner's Introducti	es Pvt ion, N	: Ltd, 2021. AcGraw-Hill Education (India						
4. B.Ro 3rd F	gers, J.Adams and S.Per Edition 2017.	nnathur, Nanotechnology: Understa	ndin	g Small Systems, CRC Press,						
5. Dr. G 2024	. Senthil Kumar and Dr	r. S. Murugavel, Physics for Civil Eng	gineer	ring, VRB Publishers Pvt. Ltd,						
6. Patra	anabis D, Sensors and T	ransducers, 2nd Edition, PHI, New	Delhi	i, 2017.						
Referen	ice Books									

- 1. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009.
- 2. Dr. G. Senthil Kumar and Dr. S. Murugavel, Physics for Information Science, VRB Publishers Pvt. Ltd, 2024.
- 3. Dr. P. Mani, Physics for Information Science, Dhanam Publications, Fourth Edition, 2022.
- 4. Dr. R. Sudharsanan and Dr. S. Devashankar, Physics for Civil Engineering, Sri Krishna Hitech Publishing Company Pvt. Ltd, 2024.

Web Resources

1. UNIT 1 - https://www.elprocus.com/difference-between-npn-and-pnp-transistor/

2.UNIT2-

https://docs.google.com/presentation/d/1u6TSbTaDN972JVuWgzJIIKW5HwouUwzW/edit?usp=drive_link&ouid=11 0360556588092263393&r pof=true&sd=true

3. UNIT 3- https://vlab.amrita.edu/?sub=1&brch=194&sim=353&cnt=1

4.UNIT 4-https://happho.com/natural-ventilation-principles-to-be-used-for-building-construction/

5. UNIT 5- https://www.sciencedirect.com/topics/engineering/displacement-sensor

СО	P01	P02	P03	P04	P05	P06	P07	P08	РО 9	P0 10	P0 11	PS 01	PS 02	PSO 3
1	3	1						2						
2	3	1						2						
3	3	1												
4	3	1												
5	3	1												

COs PO Mapping and CO Vs PSO Mapping:

COURSE LEVEL ASSESSMENT QUESTIONS

- **COURSE OUTCOME 1:** Apply the knowledge of semiconductor devices to design and optimize practical electronic systems. Apply
- How do the fundamental principles of light emission in LEDs and light absorption in solar cells illustrate the interplay between energy conversion processes in optoelectronic devices.

- 2. How does the construction and operation of solar cells demonstrate the principles of semiconductor physics and energy conversion, and what advancements in materials science could enhance their efficiency?
- **COURSE OUTCOME 2:** Understand the basics of quantum structures and their applications and basics of quantum computing. **Understand**
- 1. In what ways do the dimensional constraints in quantum wells, quantum wires, and quantum dots influence their electronic and optical properties, and what potential applications arise from these unique characteristics in advanced technological fields?
- 2. How does the operation of a single-electron transistor (SET) manipulate the behavior of individual electrons, and what implications does this have for the development of quantum computing and nanoscale electronics?
- 3. How does the symbolic representation, physical construction, and resultant truth table of a CNOT gate illuminate the role of controlled operations in quantum computing and its potential for transformative computational paradigms?

COURSE OUTCOME 3: Acquire the knowledge about heat transfer through different materials, thermal performance of building and thermal insulation. **Understand**

- 1. Imagine a quantity of heat flowing through a metal slab whose faces are kept at two different temperatures. Determine the thermal conductivity of a bad conductor.
- 2. In what manner does heat transfer occur through fenestration, and how does understanding this process contribute to the optimization of building energy efficiency and thermal comfort?
- **COURSE OUTCOME 4:** Acquire the understanding of building ventilation and air conditioning systems. **Understand**
- 1. List out the important points to be considered while designing natural ventilation for buildings.
- 2. Suppose you are hired as a consultant for a newly constructed hotel that aims to offer optimal climate control in each room. How would you explain the construction and functionality of a fan coil unit to the hotel management team?
- 3. Imagine you are tasked with designing a comprehensive fire safety plan for a commercial building that relies heavily on air conditioning systems. How would you outline measures to prevent fires caused by these AC systems?
- **COURSE OUTCOME 5**: Apply the knowledge of sensor technologies to design and implement sensor systems for real-world applications. **Apply**

- 1. Imagine you are creating a high-tech medical device that monitors a patient's condition. How would you describe the functions and importance of temperature sensors and displacement sensors in ensuring the device operates effectively?
- 2. Suppose you are leading a team tasked with designing a cutting-edge magnetometer for detecting anomalies in underground pipelines. How would you lead a discussion about the functionalities and applications of SQUID sensors in this project.

Prepared by Dr. Bency p Emmanuel, AP/Physics Verified by

Mrs. Sudharthini, AP/Physics

24CY1401	APPLIED CHEMISTRY	L	Т	Р	C
		2	0	0	2

Preamble

To enable the students to acquire knowledge in the concepts of chemistry for engineering applications and to familiarize the students with different application oriented topics like sensors, batteries, electrodes, materials for memory and display systems, corrosion prevention methods, and processes in electronics manufacture etc., which enable them to develop abilities and skills that are relevant to the study and practice of engineering chemistry.

Prerequisites for the course

Basic theoretical concepts of Chemistry in higher secondary level.

Objectives

- 1. To inculcate sound understanding of different types of sensors and batteries.
- 2. To develop an understanding of the basic concepts of electronic memory and display systems.
- 3. To make the students familiar with the principles of corrosion and electrodes.
- 4. To explore semiconductor manufacturing, PCB assembly, consumer electronics, automotive electronics, telecommunications, and microchip fabrication in the electronics industry.
- 5. To understand the electronic waste (e-waste) and manage the e-waste in an environmentally sustainable manner.

UNIT I	Energy Systems and Sensors	6
Energy Systems	Introduction classification of batteries Components construction	n working and

Energy Systems: Introduction, classification of batteries. Components, construction, working and applications of modern batteries; Zn-air and solid state battery (Li ion - polymer battery).

Sensors: Introduction, working principle and applications of Electrochemical sensors and Optical sensors. Classification of electrochemical sensors.

UNIT II	Materials for Memory and Display Systems	6

Memory Devices: Introduction, Basic concepts of electronic memory, History of organic/polymer electronic memory devices, types of organic memory devices; Organic molecules (p-type semiconductor - Pentacene; n-type semiconductor - Perfluoropentacene used as memory materials).

Display Systems: Photoactive and electroactive materials. Organic materials used in Optoelectronic devices-Light absorbing materials - Polythiophenes (P3HT), Light emitting materials - Poly[9-vinylcarbazole] (PVK)]- Materials for LCD - Liquid crystals (LC's) - Introduction, classification, properties and applications in Liquid Crystal Displays (LCD's).

UNIT III	6								
0		0							
Corrosion: Introduction, Industrial, environmental and economic impacts of Corrosion (global									
concern), types of corrosion - dry/wet Corrosion, electrochemical theory of corrosion, principle and									
preventive methods of Galvanic corrosion and Differential aeration corrosion - (Water line),									
Corrosion control methods – galvanization and sacrificial anode method.									

Electrode System: Introduction, types of electrodes. Ion selective electrode – construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode -Introduction, calomel electrode – construction, working and applications of calomel electrode. **UNIT IV Processes in Electronics Manufacture** 6 Microchip fabrication – overview, photoresists – chemistry, types. Fabrication facilities – clean rooms - maintenance, ultrapure water - specification, production processes - ion exchange, reverse osmosis. PCB fabrication – electroless and electroplating of copper – principle, bath chemistries and process parameters. UNIT V **E-Waste Management** 6 E-Waste: Introduction, sources of e-waste, Composition and Characteristics, Need for e-waste management concerning global perspective. Toxic materials used in manufacturing electronic and electrical products; health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation-thermal treatments), E-waste management rule. **Total Periods** 30 Suggestive Assessment Methods **Continuous Assessment Formative Assessment Test End Semester Exams** Test (20 Marks) (60 Marks) (20 Marks) WRITTEN TEST **ASSIGNMENT & ONLINE QUIZZES** WRITTEN TEST Outcomes Upon completion of the course, the students will be able to: Identify appropriate sensors based on the requirements of different energy systems, considering factors such as accuracy, precision, response time, and environmental 1 conditions.(Apply) 2 Apply the skills to design and optimize display systems by selecting suitable materials for applications such as liquid crystal displays (LCDs). (Apply) 3 Apply the knowledge of electrode systems used in various applications such as electroplating, batteries, corrosion monitoring, and electrochemical sensors. (Apply) Apply the knowledge in various sectors of the electronics industry. Identify suitable materials for 4 fabrication of microchip. (Apply) Recognise environmental challenges posed by electronic waste (e-waste). (Knowledge) 5 Text Books 1. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2018. 2. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2018. **Reference Books**

- 1. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
- 2. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley& Sons, 2010
- 3. Vairam Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013 2nd Edition.
- 4. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: TheNational Academies Press. doi: 10.17226/4782.
- 5. R.Gopalan, D.venkappayya, S.Nagarajan Engineering Chemistry, Vikas Publishing house private limited.
- 6. "Handbook of Electronic waste Management" International best practices and case studies.
- 7. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.

Web Resources

- 1. https://www.scribd.com/document/673718581/2710-1681213457085(Materials for memory and display systems)
- 2. https://petronthermoplast.com/conductivity-sensor-and-its-working-principle/#
- 3. https://www.st.com/resource/en/application_note/cd00003986-introduction-to-semiconductor-technology-stmicroelectronicspdf
- 4. .https://en.wikipedia.org/wiki/Photoresist#:~:text=A%20photoresist%20(also%20known% 20simply,crucial%20in%20the%20electronics%20industry.
- 5. https://www.therma.com/https-www-therma-com-cleanroom-maintenance/
- 6. https://residuoselectronicos.net/archivos/documentos/21Brasil_Widmer%20et%20al.%20G lobal%20Perspectives.pdf
- 7. https://nair.indianrailways.gov.in/uploads/files/1410168855632-PNM%20Ewast%20mgt_Abhivyakti.pdf(Toxic materials in e-waste)
- 8. https://blog.mywastesolution.com/e-waste-gold-recovery-the-right-way/

СО	P01	PO2	P03	P04	P05	P06	P07	P08	P09	PO1 0	P01 1	PS0 1	PS0 2	PSO 3
1	3	3	3											
2	3	3	3					2						
3	3	3	3											
4	3	3	3											
5	3	2				3	3	2						

CO Vs PO Mapping and CO Vs PSO Mapping

COURSE LEVEL ASSESSMENT QUESTIONS

- **COURSE OUTCOME 1:** Identify appropriate sensors based on the requirements of different energy systems, considering factors such as accuracy, precision, response time, and environmental conditions (Understand)
- **1.** You are tasked with developing a portable device designed to monitor air quality in urban areas, with a specific focus on detecting pollutants such as carbon monoxide (CO) and nitrogen dioxide (NO2). In this context, provide a comprehensive explanation of the working principles of electrochemical sensors. Additionally, discuss the advantages of these sensors offer for air quality monitoring applications, particularly in portable devices intended for urban environments. Include considerations of their sensitivity, selectivity, power consumption, size, and ability to provide real-time monitoring.
- **COURSE OUTCOME 2:** Apply the skills to design and optimize display systems by selecting suitable materials for applications such as liquid crystal displays (LCDs). (Apply)
- **1.** Choosing the right materials for applications like liquid crystal displays (LCDs) presents a challenge for engineers in terms of design and optimization. Discuss the criteria and considerations involved in material selection, including factors such as optical properties, electrical characteristics, mechanical strength, and environmental stability. Explain how these material properties influence the performance, durability, and efficiency of LCD systems. Provide examples of specific materials commonly used in LCDs and their roles within the display technology.
- **COURSE OUTCOME 3:** Apply the knowledge of electrode systems used in various applications such as electroplating, batteries, corrosion monitoring, and electrochemical sensors.(Apply)
- **1.** As an environmental scientist, you need to prepare a report addressing the electrochemical corrosion mechanism on metallic surfaces and its potential for releasing toxic products during degradation. Your report should also provide strategies to reduce environmental risks. In your report, please address the following questions:
- A).How does the electrochemical corrosion mechanism influencing metallic surfaces contribute to the undesired release of toxic products during degradation? Provide an explanation with relevant examples.
- B).What strategies can be devised to mitigate or minimize the environmental risks associated with electrochemical corrosion on metallic structures in the coastal area? Offer detailed solutions or recommendations.
- **COURSE OUTCOME 4:** Apply the knowledge in various sectors of the electronics industry. Identify suitable materials for fabrication of microchip. (Apply)
- **1.** Imagine you are an engineer tasked with optimizing the electroplating process for copper in a manufacturing facility that produces electronic components. Discuss the comprehensive steps and considerations involved in achieving a high-quality and uniform copper coating. Address the composition and control parameters of the
electroplating solution, the configuration of electrodes and management of current density, and the importance of surface preparation and treatment. Additionally, explain the quality control methods and testing techniques necessary to ensure the electroplated copper meets industry standards. Use specific examples from the manufacturing facility to illustrate how each aspect contributes to the overall effectiveness and reliability of the copper electroplating process.

- **COURSE OUTCOME 5:** Recognize environmental challenges posed by electronic waste (e-waste). (Knowledge)
- 1. Examine ecologically conscious and sustainable approaches to addressing the problems caused by electronic trash, or "e-waste." Analyze the environmental and health impacts of e-waste, and examine the roles of various stakeholders, including manufacturers, consumers, and policymakers, in mitigating these challenges. Provide specific examples of effective e-waste management practices and policies, and propose innovative solutions for reducing, recycling, and responsibly disposing of e-waste

Prepared by, Dr. Sujapon Mini, Prof./Chemistry AP/Chemistry

Verified by, Dr. Jona,

		L	Т	Р	С
24CS1501	INTRODUCTION TO PROGRAMMING WITH C	3	0	0	3
Preamble					
This course aims	to provide the students with a foundation of structured	and	proce	edur	al
programming with o	computer programming and C programming concepts. The focus	is to	develo	op tl	he
basic programming	skills in students, and to improve their proficiency in app	plying	g the	bas	sic
knowledge of prog	to the field of engineering	aevei	op mo	aul	ar
Pre-requisites for t	the course				
• NIL					
Objectives					
1. To learn the i	introduction to computing and basics of structured programming	g with	ı C.		
2. To learn Con	trol structures and functions and their implementation in C.				
3. To learn arra main memor	lys and strings concepts & functions in C and use pointers for stor y efficiently.	ing d	ata in	the	
4. To learn stru	ctures and union concepts of C Programming				
5. To learn file _l	processing functions and further develop applications in C.				
UNIT I	INTRODUCTION TO COMPUTING AND C LANGUAGE			6+3	3
Introduction to Com	puting - Memory, Registers - Variables, Values, Instructions, Pro	grams	s - Cor	npu	ter
Languages (Machine	e/Assembly/High level language) - Compilers, Assemblers, Inte	rpret	ers, L	oad	ers
Programming parad	ligms -Data representation and conversions -Pseudocode, Algorit	:hm, F	lowcł	nart.	
C: Evolution of C, C	haracteristics and applications of C - Structure of a 'C' program	-Com	pilatio	on a	ind
Execution of C Prog	ram-Data Types- Variables- Constants, Type Conversion- Type	castin	g, C T	oke	ns-
	rs-Operators -Precedence and Associativity -1/O statements –Sin	ipie p	rogra	ms.	
SUGGESTED ACTIV					
 Demonstrate Demonstrate 	Algorithms and Flowcharts using tools.				
 Demonstrate 	simple programs with I/O statements				
SUGGESTED EVALU	IATION METHODS				
Assignment of the second	on algorithm and flowchart				
• Quiz on prob	lem solving and basics of C programming				
Questioning	with Code snippets				
UNIT II	CONTROL STRUCTURES AND FUNCTIONS			7+	3
Control structures:	Branching and Iterative statements- Decision making - Loop	ing s	tatem	ents	5 -
Nested Loops-break	and continue statements -Pattern printing.		P		
Functions: Declara	ation, Definition, function Call, arguments and Return states	nent-	Para	met	er
	TTIES				
Comparison	study on the types of decision making and looning statements				
Demonstratio	on on control structures and functions				
- Demonstration					

Demos on Recursion, Pattern printing.	
SUGGESTED EVALUATION METHODS	
• Quiz on data types, operators, statements, loops and arrays, Questioning with Code snip	pets
Code Walk throughs - Tutorials,	
• Coding Assessment -Online platforms -Hackerrank, Leetcode, Code force.	
UNIT III ARRAYS, STRINGS AND POINTERS	7+3
Arrays: Declaration, Initialization - Operations- One dimensional Arrays- Traversal, Sear Sorting, Merging of arrays - Two Dimensional Arrays- Matrix operations - Multidimensional Arr Strings: String operations - Array of Strings. Pointers: Declaration- Definition- Pointer Arithmetic- Null, Void, Wild / Dangling, constant poin Pointers and Arrays- Pointers and Functions- Pointers and Strings- Pointers to Pointers, Dy Memory Allocation.	rching, rays- nters, - vnamic
SUGGESTED ACTIVITIES	
 Demonstration of Application of Arrays -Image processing. Discussion on array of pointers, function pointers and array of function pointers. Demonstration on dynamic memory allocation. Solve problems on pointers to arrays, pointers to functions and pointers to pointers. 	
SUGGESTED EVALUATION METHODS	
Quiz on basics of Arrays, strings and pointers.	
Programming Assignment, Code Walkthroughs.	
• Coding Assessment -Online platforms -Hackerrank, Leetcode, Code force.	
UNIT IV STRUCTURES AND UNIONS	5+3
Structure: Declaration and Initialization- Nested Structures- Array of Structures- Structure functions- Structure pointers- Self-referential structures. Unions: Declaration and Initial Structures and unions.	es and ization-
SUGGESTED ACTIVITIES	
 Discussion and comparison of Structures and Unions. 	
 Self-referential structure -Linked list application. 	
 Write programs using nested structures and union inside structures. 	
SUGGESTED EVALUATION METHODS	
 Demonstration of programs using pointers to structures and self-referential structures 	
Simple application development	
UNIT V FILE PROCESSING AND PRE-PROCESSOR DIRECTIVES	5+3
Introduction to Files -Using Files in C- File modes - File operations - Error Handling dur operations- Command line arguments- Pre-processor Directives - Macros - Unconditional directives- Error handling in C, Debugging and Testing.	ing file ectives-
SUGGESTED ACTIVITIES	
Discussion on types of pre-processor directives.	
• Demonstration of programs using file operations, pre-processor directives.	
Simple application development.	
SUGGESTED EVALUATION METHODS	

• Assignment on modes of operations using files in C.

Simple Applications-File operation	1S.						
	Тс	otal Periods 45					
Suggestive Assessment Methods							
Continuous Assessment Test (20 Marks)Formative Assessment Test (20 Marks)End Semester Ex (60 Marks)							
 DESCRIPTIVE QUESTIONS PROGRAMING AND PROBLEM SOLVING QUESTIONS CODE WALKTHROUGHS 	1.ASSIGNMENT 2.ONLINE QUIZZES 3.PROBLEM-SOLVING ACTIVITIES	1.DESCRIPTIVE QUESTIONS 2.PROGRAMING AND PROBLEM SOLVING & LOGICAL THNKING QUESTIONS					
Course Outcomes							
Upon completion of the course, the stu	dents will be able to:						
 CO1 Apply algorithmic thinking to under CO2 Apply code reusability using function CO3 Use strings, arrays and pointers in CO4 choose appropriate construct based organizing data. CO5 Develop application with file operate Text Books 1. Beecher K. Computational Thinking: A Learning & Development Limited, 20 2. Stephen G Kochan, Programming in C 3. Brian W. Kernighan, The C Programm 4. Brian W. Kernighan, Dennis M. Ritchi Publications; 1 edition (2012) 	stand, define and solve probl ons, control structures and sol to solve complex problems. on the problem requirement tions to develop real time solu A beginner's guide to Problem 17. C, Third Edition, 2004. hing Language (Ansi C Version e, Programming Languages C	ems. (Apply) lve problems. (Analyze) (Apply) ts and provide solutions on (Apply) itions. (Analyze) solving and Programming. BCS n), PHI; 2 edition (1990). with Practicals, Margham					
Reference Books							
 Byron Gottfried "Programming With C" Fourth Edition, McGrawHill, 2018. Yashvant P. Kanetkar. "Let Us C", BPB Publications, 2016. R. G. Dromey, "How to Solve It By Computer", Pearson, 1982 							
 Web Resources 1. https://www.programiz.com/c-progr 2. https://nptel.ac.in/courses/1061051 3. https://www.javatpoint.com/c-progr 4. https://www.tutorialspoint.com/cprogr 5. https://www.w3schools.com/c/ 6. https://www.cprogramming.com 	ramming 71/ amming-language-tutorial ogramming/index.htm						

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PSO1	PSO2	PSO3

1	3	3	3		2			1	
2	3	3	3		2			1	
3	3	3	3		2			2	
4	3	3	3		2			2	
5	3	3	3		2			3	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

Course Outcome 1 (CO1): (Apply)

Write algorithm and draw flowchart

- 1. To count the even numbers between 1 and 200 and print the sum
- 2. To calculate the simple interest and compound interest
- 3. To calculate sum of the digits of a number and check if "sum" is an Armstrong number

Course Outcome 2 (CO2): (Apply)

- 1. Write a program to print the grade of a student based on his marks using switch case.
- 2. Write a program to print the following pattern
 - 1 22 33
 - 333
 - 4444
 - 55555
- 3. Write a program to input the elements of a two dimensional array. Then from this array make two arrays: one that stores all the odd elements of the array and other that stores all the even elements of the array

Course Outcome 3 (CO3): (Apply)

- 1. Write a program using function to calculate 'x' to the power of 'y' where 'y' can be positive or negative.
- 2. Write a program to read a paragraph. Then count the number of words, number of lines, number of vowels and number of sentences in it
- 3. Find the output of the following:

```
main(){
      char *str="ABCDEFGH";
      (*str++); // what will happen if str++; is given here??
      printf("%s",str); }
Course Outcome 4 (CO4): (Apply)
1. What will be the output of the C program?
     #include<stdio.h>
     int main() {
     enum numbers
     {
       n1 = 1.5, n2 = 0, n3, n4, n5, n6
    };
       printf("%d %d\n", n1, n2);
     }
2. How many bytes in memory taken by the following C structure?
  #include <stdio.h>
  struct test {
    int k;
    char c;
```

```
};
```

Course Outcome 5 (CO5): (Apply)

- 1. Write a program to create a file and store 20 names in it. Write a program to read the names in the file in the reverse order without reopening the file
- 2. Write a program that reads the file name and text of 20 words as command line arguments.

Write the text into a file whose name is given as the file name

Prepared by, Dr. T.C.Subbu Lakshmi, Asso.Professor /IT Verified by, Dr.G.Aravind Swaminathan, Prof/ CSE

		L	Т	Р	С			
24HS1103	TAMIL HERITAGE	2	0	0	1			
Preamble Tamil peoj and exhibi	Preamble : This course is offered to equip students to create awareness of the contribution of Tamil people to Indian culture by highlighting the characteristics of Tamil language and literature and exhibiting Tamil culture through traditional arts such as performing arts and fine arts.							
The prerect Heritage.	The prerequisites for the course: The prerequisite knowledge required to study this course is basic knowledge in English and Tamil Heritage.							
UNIT I	UNIT I LANGUAGE AND LITERATURE 6							
Language Literature Literature literature	Language Families in India-Dravidian Languages –Tamil as Classical Language –Classical Literature in Tamil – Secular Nature of Sangam Literature –Distributive Justice in Sangam Literature Management Principles in Thirukural -Forms of minor Poetry development of Modern literature in Tamil-Contribution of Bharathiyar and Bharathidhasan.							
UNIT II	HERITAGE-ROCK ART PAINTINGS TO MODE SCULPTURE	RN ART-			6			
Hero ston making- M Making of	Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making- Massive Terracotta sculptures, Village Deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridangam, Parai, Veenai, Yazh and Nadhaswaram							
UNIT III	FOLK AND MARTIAL ARTS				6			
Therukoot Silambatta	chu, Karakattam, Villu Pattu, Kaniyan Koothu, Oyi am, Valari, Tiger dance-Sports and Games of Tamils.	lattam, I	Leathe	er pupp	etry,			
UNIT IV	THINAI CONCEPT OF TAMILS				6			
Flora and Literature and Ports	Fauna of Tamils & Agam and Puram Concept from -Aram Concept of Tamils - Education and Literacy during of Sangam Age-Export and Import during Sangam Age-Ove	Tholkapp Sangam A rseas Con	iyam Age - A quest	and San Ancient C of Cholas	gam lities s.			
UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE					6			
Contributio parts of In Medicine–In	Contribution of Tamils to Indian Freedom Struggle-The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement – Role of Siddha Medicine in Indigenous Systems of Medicine–Inscriptions & Manuscripts–Print History of Tamil Books.							
		fotal Peri	ods	30				
Assessme	ent Method		cm or	+ 2				
		ous Asses	smen	u 2				

Francis Xavier Engineering College/ Dept of AI& DS/R2024/Curriculum and Syllabi/VIII Board of Studies

50 marks	50 marks

Course Outcomes:

C01	To widen the knowledge on the characteristics of Tamil language and literature.
CO2	To explore the traditional Tamil fine arts and its techniques of Tamil Heritage.
CO3	To evaluate the various types of performing arts and their cultural context.
CO4	To get an insight on the lifestyle and living techniques of Tamil ancestors.
CO5	To recognise and perceive the role played by Tamils in the unity and development of India.

		LUFU	маррп	ig:							
со	PO 1	P0 2	РО 3	РО 4	РО 5	РО 6	PO 7	РО 8	РО 9	PO 10	P0 11
2								1	3	2	3
3								1	3	2	1
4								3	2	2	3
5								2	3	3	2

CO DO Manning

TEXT-CUM-REFERENCE BOOKS

- 1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL-(in print)
- 2. Social Life of the Tamils- The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
- Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu) 3. (Published by: International Institute of Tamil Studies).
- The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: 4. International Institute of Tamil Studies.)
- Keeladi-'Sangam City Civilization on the banks of river Vaigai'(Jointly Published 5. by:Department of Archaeology &TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
- 6. Studies in the History of India with Special Reference to TamilNadu (Dr.K.K.Pillay) (Published by: The Author)
- 7. Porunai Civilization(Jointly Published by:Department of Archaeology &TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
- Journey of Civilization Industo Vaigai(R.Balakrishnan)(Published by:RMRL)-Reference 8. Book.

Prepared by, Dr.V Ponraj, AP/Tamil

Verified by, Dr. Nagarajan, AP/Tamil

		L	Т	Р	С		
24HS1103	தமிழர் மரபு	2	0	0	1		
முன்னரை(Pream	ıble)						
இப்பாடத்திட்டம்	் பொறியியல் பயிலும் முதலாம் ஆண்டு	மாணவ	ர்களின்	முதல	ாம்		
ு. பருவத்திற்கு உர	ியது. தமிழ் மொழி மற்றும் இலக்கியத்தின் த	ன்மைக	் ளை எடு	த்துரை த	த்து		
மரபுக் கலைகளா	ான நிகழ்த்து கலைகள் மற்றும் நுண்கலைகள் வழ	ியாகத் த	5மிழ்ப் ப	ண்பாட்	പെ		
பலப்படுத்தி இந்	திய பண்பாட்டிற்கு தமிழர்கள் ஆற்றிய பங்கி	னை மா	ாணவர்க	ள் அறி	யச்		
செய்தல்.							
பாடநெறிக்கான	r முன்நிபந்தனைகள்(Prerequisites for the course)						
தமிழ் மொழியில்	எழுத படிக்க தெரிந்திருத்தல் அவசியம்.						
அலகு I	மொழி மற்றும் இலக்கியம்			6			
இந்திய மொழிச்	5 குடும்பங்கள்- திராவிட மொழிகள் - தமிழ்	் ஒரு ெ)சம்மொ	ழி - த	மிழ்		
செவ்விலக்கியங்	கள் - சங்க இலக்கியத்தின் சமய சார்பற்ற தன்	ாமை - ச	ங்க இல	க்கியத்	தில்		
பகிர்தல் அறம் - 🧕	திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - சிற்றி	லக்கியா	்கள்- தப	பிழில் ந	ഖ്ത		
இலக்கியத்தின்	வளர்ச்சி- தமிழ் இலக்கிய வளர்ச்சியில் பாரத	ியார் ம	ற்றும் ப	ாரதிதா	சன்		
ஆகியோரின் பங்	களிப்பு.						
	மரபு- பாறை ஓவியங்கள் முதல் நவீன ஓவி	பங்கள்		6			
AND II	வரை- சிற்பக்கலை			0			
நடுகல் முதல் நவ	ீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள்- பழ	ங்குடியில	ார் மற்று	ம் அவர்	கள்		
தயாரிக்கும் சை	வினைப் பொருட்கள், பொம்மைகள்- தேர்	செய்யும்	ക്കെം-	சுடுப	ண்		
சிற்பங்கள் - நா	ட்டுப்புறத் தெய்வங்கள்- குமரி முனையில் திர	நவள்ளுவ	பர் சிலை	-	ைக்		
கருவிகள்- மிருத	ங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் -						
அலகு III	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளைய	ாட்டுகள்		6			
தெருக்கூத்து, கர	காட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயில	ாட்டம், 🕻	தோல்பா	வைக் கூ	த்து,		
சிலம்பாட்டம், வ	ளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்						
அலகு IV	தமிழர்களின் திணைக் கோட்பாடுக	ள்		6			
தமிழகத்தின் தா	வரங்களும், விலங்குகளும் - தொல்காப்பியம் ட	மற்றும் ச	-ங்க இல	க்கியத்	தில்		
அகம் மற்றும் பு	றக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்	கோட்பா	டு - சங்க	காலத்	தில்		
தமிழகத்தில் எழுத்தறிவும் , கல்வியும் - சங்க கால நகரங்களும் துறைமுகங்களும் - சங்க							
காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.							
	இந்திய தேசிய இயக்கம் மற்றும் இந்திய			6			
900 v	பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு			0			
இந்திய விடுதன	இந்திய விடுகலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிம்ப்						
பண்பாட்டின் தா	பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவக்கின்						
பங்கு - கல்வெட்(நகள், கையெழுத்துப்படிகள் - தமிழ் புத்தகங்களில	ன் அச்சு (வரலாறு				

Total Periods		30
Assessment Method		
Continuous Assessment 1	Continuous Assessme	ent 2
50 marks	50 marks	

எதிர்பார்க்கும் படிப்பின் முடிவுகள்

C01	மாணவர்கள் தமிழ் மொழி மற்றும் இலக்கியத்தின் தன்மைகள் குறித்து அறிந்து கொள்வார்.
CO2	தமிழ் மரபு சார்ந்த நுண்கலைகளையும் அதன் நுட்பங்களையும் புரிந்து கொள்வர்.
CO3	நிகழ்த்து கலைகளின் வகைகளையும் அதன் பண்பாட்டுச் சூழலையும் அறிந்து கொள்வர்.
CO4	பழந்தமிழரின் வாழ்க்கைச் சூழல்களை அறிந்து கொள்வர்.
C05	இந்திய ஒருமைப்பாட்டிற்கும் வளர்ச்சிக்கும் தமிழர்கள் ஆற்றிய பங்கு குறித்து அறிவர்.

CO PO Mapping:

СО	PO 1	РО 2	РО 3	РО 4	РО 5	РО 6	P0 7	РО 8	РО 9	P0 10	P0 11
1								1	2	3	1
2								1	3	2	3
3								1	3	2	1
4								3	2	2	3
5								2	3	3	2

TEXT-CUM REFERENCE BOOKS

- தமிழக வரலாறு மக்களும் பண்பாடும் கே. கே பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநால் மற்றும் கல்வியியல் பணிகள் கழகம்).
- 2. கணினித்தமிழ் முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
- கீழடி வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
- 4. பொருநை ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

Prepared by,		
Dr.V Ponra	j, AP	/Tamil

Verified by, Dr. Nagarajan, AP/Tamil

2 4 HS1101	PROFESSIONAL COMMUNICATION SKILLS		T	Р	C
241131101	2	0	2	3	
Preamble					
This course is so as to com them the nec	s offered to equip students with the necessary skills to listen, reac prehend and successfully convey any idea, technical or otherwi essary polish to become persuasive communicators.	l, wri se, as	te, a wel	nd sp 1 as g	eak give
Prerequisite	es for the course				
The prere Language.	quisite knowledge required to study this Course is the basic know	ledge	in E	nglisł	1
Objectives					
 Develor effecti writin Equip their p Enhan situati vocab Enhan conter Develor relate vocab 	op students' ability to critically analyze technical concepts and vely through various communication methods (listening, s g). students to analyze biographies, effectively introduce themselve personal and professional goals. ce students' listening and speaking skills for clear commun ons. Improve writing abilities through creating dialogues, and sol ulary knowledge. ce students' ability to effectively analyze information, craft person t, and present it confidently. op students' understanding of professionalism, enhance their cond d to company profiles and engineering projects, and strengthen to ulary in professional contexts.	d art peaki ves, a icatio idify { uasive nmur cheir {	icula ing, nd a n in gram e eng nicati gram	ite th read rticul dive imar gineer ion sl mar	iem ing, late erse and ring kills and
Unit I	Sharing Basic Technical knowledge		1	2	
Listening: L presentation - logical flow visual aid; R content - iden	istening to basic technical concepts- Cloze test - Note making on fundamental technical concepts - sentence structure - Key mer of for a technical presentation - delivery techniques - principles eading: Articles on Technical concepts from journals - comprehentify the main ideas presented - note down the purpose of the con	; Spe ssage of us ensior tent -	akin - Sto sing n - d Pee	n g : Sh orytel effec efine r revi	iort ling tive the ew;

Writing: Short passages on technical topics - Write topic sentences for given prompts - develop and organize supporting sentences - organizing ideas into journals - jumbled sentences - Practice using transitional words and phrases; **Grammar:** Tenses - Present - Past - Future; **Language Development**: Synonyms - Antonyms

Unit II Self-Introduction and Speaking Skills 12

Listening: Watch/Listen to videos on self introduction - vocabulary - phrases - analyzing the content - Note Making; **Speaking:** Self Introduction (Video Creation) - greeting - basic information - educational background - strengths and weaknesses - key skills relevant to engineering - Extracurricular Activities and Interests - future goals and aspirations - conclusion; **Reading:** biography of eminent personalities - Early Life and Influences - Major Achievements and Innovations - Challenges and Resilience - Impact and Legacy; **Writing:** Greeting and Introduction - personal background - skills and strengths - personal interests - future aspirations; **Grammar:** Subject verb agreement; **Language development:** Word Formation - prefixes & suffixes - one word substitutions

Unit III	Conversational Skills	12
Listening: L	isten to short audio dialogues on greetings, introductions, and sr	nall talk - Identify
	1	

key vocabulary and conversational routines - Listen to podcasts or interviews on interesting topics - Identify main points, supporting arguments, and speaker opinions; **Speaking:** Practice greetings, introductions, and small talk in pairs - Role-play - conversation on technical topics - reviewing a gadget/products - merits and demerits; **Reading:** Reading short conversations - identify and analyze jargon used in various contexts, such as technology, medicine, finance, and marketing, through reading and analyzing short conversations; **Writing:** Write short dialogues based on learned greetings, introductions, and small talk phrases - write a short dialogue demonstrating effective communication strategies in a chosen scenario (e.g., negotiation, disagreement); **Grammar:** "Wh" Question - Yes/No Questions - Indirect questions - Adjectives; **Language Development:** Phrasal verbs.

Unit IV	Persuasive Discourse Skills	12
Listening: L	isten to persuasive presentations by engineers, pitches to investo	ors for engineering
projects, and	debates on engineering ethics or approaches - Identify and ana	lyze the speaker's

projects, and debates on engineering ethics or approaches - Identify and analyze the speaker's use of technical evidence, data visualization, rhetorical devices, and common logical fallacies in engineering contexts - Evaluate the effectiveness of different persuasive techniques used to convince stakeholders and audiences in the engineering field; **Speaking:** Develop and practice persuasive presentations on engineering projects, design solutions, or technical proposals -Focus on clear and confident delivery with strong vocal variety, body language, and effective use of visual aids like charts, diagrams, and 3D models - Participate in mock client meetings, design reviews, and engineering debates, employing logical reasoning, and ethical arguments – press conferences; **Reading:** Analyze persuasive engineering texts like proposals, reports, and articles; **Writing:** Social media description - blog writing - Product Description - White Paper writing -Product Release/Launch Notes - Write Journals on emerging trends; **Grammar:** Direct and Indirect Speech; **Language Development:** Technical Definitions

Unit V	Professiona	l & Career Skills							12	
Listening: In	ntroduction to	Professionalism	- Professional	ethics	and	respo	onsił	oility -	Worl	kplace
					-				-	

culture and diversity awareness - Time management and organizational skills; **Speaking:** Company profile - Introduction - Briefly introduce the company, its mission, and its products/services - Engineering Focus - Dive deeper into the company's engineering projects, showcasing the kind of work their engineers do - Use visuals and data if available - Culture and Benefits - Briefly touch on the company culture, work environment, and any unique benefits they offer engineers (e.g., mentorship programs, professional development opportunities) - Career Opportunities - Mention potential career paths for engineers at the company and any internship or job openings; **Reading:** News Articles from Companies/Industries - Magazine Articles - Note Making - Comprehension; **Writing:** Writing about a company - engineering projects and technologies - problem the company solves - culture, benefits, and careers - Opinion Article - Checklists - Write prompts for the given scenario; **Grammar:** Question tags; **Language Development:** Compound words - Cloze test - modal verbs; Vocabulary Development - Fixed and Semi-Fixed Expressions.

		l otal Hours: 60
S.No	List of Exercises	СО
1.	Assessment on 10 Videos on Basic Technical Concepts	CO 1
2.	Self-Introduction Video	CO 2
3.	Conversation - Audio Recording (10 Topics)	CO 3
4.	Presentation on the working principle of a gadget/Product	CO 4
5.	Writing about a Company	CO 5

Total Periods - 30 Theory +30 Lab

Continuous Assessment	Lab Components Assessments	End Semester Exams
(20 Marks)	(30 Marks)	(50 Marks)
Written Examination	Completion of Suggested Exercises	Written Examination

Outcomes

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

CO 1	Enumerate basic information using communication etiquette on par with international communication standards. (Apply)
CO 2	Interpret fundamental technical concepts in English language giving importance to syntax. (Apply)
CO 3	Evaluate advanced varied technical concepts in the current scenario and emerging trends to invent new concepts. (Apply)
CO 4	Write solutions for problems identified using the exact vocabulary and structure without grammatical errors as expected by the corporate world. (Apply)
CO 5	Manage and respond to self, others' emotions using skills of Self Awareness, Self Management, Self Motivation, Empathy & Social Relations to be an Emotionally Intelligent Human Being. (Apply)

Text I	Books														
1	Revn	olds	Iohn	Camb	ridge	IGCSE	EÂREI	First 1	Langua	age E	nølish	201	8th ea	d Ha	odder
1.	Education, 2018														
2.	Michael Swan, Practical English Usage (Practical English Usage), Jun 2017. 4th edition.														
	Oxford University Press, UK														
Refer	Reference Books														
1.	Michael Swan, Catherine Walter, Oxford English Grammar Course Advanced, Feb 2012, 4														
2	th Ed	ition, (Jxford		ersity F	ress,	UK :- En e	1: -1- 0	C		ь: 	C - 11			
2. 2	Mich	S, L. H	10mas	and E	Finalia	angio	is, Eng	glish &	Comn	h Uga	tion F(or Coll	eges.	dition	`
5.	Ovfor	d Univ	dII, FIC Porcity	Droce	LIGUS	II USA	ge (FI	ictical	Eligiis	II USAĘ	gej, jui	1201/	, 4th e	untion	l,
Weh I	Resource	rces	ersity	11033	, 0K										
1	Self Ir	ntrodu	ction	httns	//vouti	ı he∕∩	sa53-R	VRk4							
2	Work	ing Pr	incinle	of a G	adget [.]		5055 1								
2.	https:	//wwv	v.vout	ube.co	m/cha	nnel/U	IC6af8	AGvAG	iixZXW	/dxapv	Caw				
3.	Podca	st Cha	nnels	: Hube	erman	Lab -	https:	//www	w.hub	erman	lab.co	m/pod	lcast		
	The D)iary o	f a CE(0 - htt	ps://st	tevent	artlet	t.com/	doac			/ P			
	Time	s of Ind	dia - h	.//	times	ofindia	a.india	times.	com/p	odcas	ts				
4.	Produ	ıct Rev	view: <u>h</u>	nttps://	/youtu	.be/By	hA05x	7CWI							
5.	Times	s of Inc	lia: <u>ht</u> i	tps://ti	imesof	india.iı	ndiatin	nes.cor	n/horr	ne/hea	<u>dlines</u>				
6.	Lister	ning to	Techr	nical ta	alks:										
	Auto	Car In	dia <u>htt</u>	:ps://m	n.youtu	ibe.cor	m/user	/autoo	arindia	<u>a1</u>					
	Lesic	s : <u>http</u>	s://wv	vw.you	utube.c	:om/ch	nannel/	/UCqZ(QJ4600	a9wlfl	MPbYc	<u>600Q</u>			
	Stude	ent Ene	ergy <u>ht</u>	ttps://\	www.y	outub	e.com/	'user/s	tudent	energy	/?app=	deskto	<u>qc</u>		
7.	Types	s of Lis	tening	g <u>https</u>	://wwv	v.yout	ube.co	m/wat	ch?v=	22gzvS	indTU	&t=1s			
CO Vs	PO Ma	apping	g and	CO Vs	PSO N	lappi	ng								_
	DO	DΟ	DΟ	DO	DΟ	DΟ	DO	DO	DΟ	DO	DΟ	DC	DC	PS	
CO	1	2	2	10	5	6	7	l U Q	0	10	11	01	02	0	
	T	2	3	4	3	0		0	9	10	11	01	02	3	
1									1	3					
2									1	3					
3									1	3					

SUGGESTED COURSE LEVEL ASSESSMENT QUESTIONS:

COURSE OUTCOME 1 (CO 1) :

4

5

- 1) Listen to the talk on basic technical topics and answer the questions provided.
- 2) Introduce yourself in a professional way highlighting Characteristics, Strengths & Weaknesses.

2

1

3

3

- 3) Read the given technical passage and answer the questions provided.
- 4) Frame Yes/No Questions for the statements given.

- 5) Frame Question tags for the statements given.
- 6) Rearrange the jumbled words into a meaningful sentence.
- 7) Complete the sentence with the Noun form/ Verb Form/ Adjective form (as Directed) of the word given.
- 8) Give the expansion of the Abbreviations given.

COURSE OUTCOME 2 (CO 2) :

- 1) Listen to the technical lecture and answer the questions provided.
- 2) Introduce a device or a gadget to the class giving importance to its specifications, description, merits and demerits.
- 3) Read the given passage / short narrative / article from a journal or newspaper to the class.
- 4) Write your review on any one of the gadgets you are using.
- 5) Frame "Wh" Questions for the statements given.
- 6) Punctuate the following statement given.
- 7) Complete the sentence using the fragments given.
- 8) Write a short passage on the given topic.
- 9) Fill in the blanks with the suitable prefix or suffix as directed.

COURSE OUTCOME 3 (CO 3) :

- 1) Listen to the technical talk on the emerging trends and complete the statements given. (Cloze Test)
- 2) Ask questions to get an opinion about technical gadgets / software / devices
- 3) Read the given article from a journal and provide your ideas for further developments.
- 4) Rearrange the following jumbled sentences in the proper chronological order.
- 5) Write a short essay on any one of the given technical topics highlighting the future scope of the product.
- 6) Rewrite the following into Indirect Speech.
- 7) Frame indirect questions for the questions given.
- 8) Fill in the blanks with the suitable articles.
- 9) Give the one word substitutes for the given statement.

COURSE OUTCOME 4 (CO 4) :

- 1) Listen to the technical talks and write down the merits and demerits of the product discussed.
- 2) Watch the video, evaluate the concept and express your solutions to the problem.
- 3) Read the given article and note down the problems stated.
- 4) Write down solutions for the problems faced while using a product.
- 5) Draft a white paper writing for the given situation..
- 6) Write launch notes for a product.
- 7) Convert the given statement to another form of the tenses as directed.
- 8) Pick out the suitable synonym for the underlined word in order to minimize plagiarism.
- 9) Fill in the blank with the suitable phrasal verb.

COURSE OUTCOME 5 (CO 5) :

- 1) Watch the video on Types of listening and answer the questions.
- 2) Make a presentation on the importance of Emotional Intelligence.
- 3) Read the given article on High level cognition and answer the questions.
- 4) Read the article on social behaviour and redraft it in your own style.
- 5) Comprehend the passage and give your inputs for decision making.

- 6) Watch the video and articulate your emotions using appropriate words.
- 7) Write a note on optimism and pessimism.
- 8) Fill in the blank with the suitable modal verb.
- 9) Pick out the suitable fixed/ semi-fixed expression to complete the given statement.

Prepared by, Mr. David Ayling J, AP/ English

Verified by Ms. Thamizh Paavai, AP/English

24PC1311	APPLIED PHYSICS AND CHEMISTRY LABORATORY	L	Т	Р	С
		0	0	4	2
Preamble		1	1		
The objective of this of	ourse is to enable students to develop their practical applic	ations	in the		
engineering sector by	applying the concepts in an appropriate manner to modern	ı techr	nology	and to	gain
practical knowledge t	hat correlates with the theoretical studies.				
Prerequisites					
Basic practical concep	ots of Physics and Chemistry in higher secondary level.				
Objectives (Physics)					
To demonstrate practical experim	and to reinforce the theoretical concepts learned in p nents.	hysics	lectu	res thr	ough
• To interrogate the physics.	ne competency and understanding of the basic concepts	found	d in e	xperim	ental
• To gain knowledg	ge of the practical applications of electronic mechanisms.				
• To look into meas	surement and technique problems in experiments.				
To familiarize ph accurate measure	ysics concepts and to design instruments and experiment ements.	al sets	s for b	etter a	nd

Francis Xavier Engineering College/ Dept of AI& DS/R2024/Curriculum and Syllabi/VIII Board of Studies

Objectives (Chemistry)

- To interpret the students by acquiring practical skills in the determination of water quality parameters quantitatively for industrial and fabrication processes through volumetric analysis.
- To develop an understanding about the range and uses of analytical methods in chemistry.
- To gain knowledge for the measurement pH of sample solutions to detect any potential environmental issues by measuring the hydrogen-ion activity in water-based solutions.
- To demonstrate the students with a practical approach towards the various techniques to monitor and control the quality of the treated water.
- To explain the concept of corrosion, its causes, and its environmental consequences.

	PHYSICS							
S. No	List of Experiments (Any five)	CO						
1	Determination of Energy gap of a material of P-N Junction diode (Forbidden energy band gap kit).	4						
2	Determination of Planck's constant and work function using the principle of photoelectric effect.	3						
3	Determination of Young's modulus of the material - Non Uniform bending method.	2						
4	Determination of thermal conductivity of a bad conductor – Lee's Disc method.							
5	Determination of the velocity of sound and compressibility of liquids- Ultrasonic interferometer.	5						
6	Study of I-V Characteristics of solar cell and determination of its efficiency	4						
7	Study the characteristics of LED and LASER sources.	4						
	CHEMISTRY							
S. No	List of Experiments (Any five)	CO						
1	Analysis of water sample (hardness) for industrial applications and fabrication processes.	1						
2	Estimation of iron in pharmaceutical samples by Potentiometry.	2						
-	(Electrochemical sensor).	_						
3	Determination of acid concentration using pH metry (pH sensor).3							
4	Utilization of Conductometric analysis for determining the strength of NaOH solution.	4						

5	Corrosion Experiments - Weight loss method and Potentiometry.		5
6	Design a molecular structure using Chem Draw and a computation	al model.	2
7	Analysis of water (Alkalinity) for industrial and fabrication purpose	es.	1
	List of Projects (PHYSICS)		
		Related	
S. No.	List of Projects	Experime nt	CO
1	To study Infrared radiation emitted by different sources using phototransistors.	2	3
2	Design a circuit for cool automatic timer controlled Light which controls vehicle traffic passing through the intersection of two or more roadways by giving a visual indication to drivers when to proceed, when to slow, and when to stop using LED and 4017 counter IC along with the 555 timer.	7	4
3	Design temperature controlled circuits trigger automatically when the ambient temperature goes beyond a set limit of, say, 50 degrees centigrade. This temperature setting can be changed as per requirement through the potentiometer in the circuit.	4	1
4	Using ultrasonic sensor, design a ultrasonic distance finder using 8051	5	5
5	Design a water level indicator by connecting a Buzzer, resistor and transistor in series and connect this in parallel to LED.	7	4
	List of Projects (CHEMISTRY)		
		Related	
S. No.	List of Projects	Experime nt	CO
1.	 Water Analysis: Analysis of perennial Thamirabarani River water samples collected from various locations (before and after blending of industrial waste water). i) Determination of various physical and chemical parameters (Hardness, pH, TDS, Alkalinity) of different water samples. ii) From the result, give a detailed report about the water sample whether it is fit/unfit for domestic and industrial purposes. 	1,3	1,3

2	Design the molecular structure of Biomo methods.	olecules by computational	2	2		
3	Determination of thermal conductivity of mixtures using IoT model (Temperatu sensor)	of Pure liquids and binary are sensor and Turbidity	4	4		
4	 Air quality monitoring: Study of air portion of the early morning, noon and expressions by Arduino method. i) From the observations give a det impact of air pollution on human healt ii) Deduce an explanatory report on explanatory report on explanatory. 	ollution in Nellai smart vening due to CO/CO2 ailed report about the ch. environmental impact due	4	4		
5	 Food adulteration: Investigation of adult stuffs milk, chilli powder, turmeric pow and ghee) by Chemical methods. i) Give a report on the presence of a food samples. ii) From the observations give a brief if food adulteration on human health. 	lterants in various food der, wheat flour, honey dulterants in the given report about the impactof	5	5		
Lab Asse	ssment					
	Internal Assessment	External A	ssessment			
	(60 Marks)	(40 M	Marks)			
Upon com	pletion of the course, the students will be a	able to:				
CO1	Analyze the experimental data to detern understand and predict heat transfer in	mine thermal conductivity, materials. (Analyze)	enhancing th	eir ability to		
CO2	Analyze the bending of materials une material properties. (Analyze)	der load and relate the c	observed defe	ormation to		
CO3	Interpret the experimental results to care reinforcing their understanding of the p	lculate the Planck's constand hotoelectric principle. (App	nt and the wo oly)	ork function,		
CO4	Analyze the experimental data to deve semiconductor devices and use th engineering.(Analyze)	elop practical skills and a is knowledge to desigr	deeper unde 1 new expe	rstanding of eriments in		
CO5	Gain a deeper understanding of the practical laboratory skills. (Apply)	acoustic properties of lic	quids and en	hance their		
Outcom	es (Chemistry)					
CO1	Analyze the water quality related para	meters quantitatively for i	industrial and	l fabrication		

CO2	Interpret the use of equipment and accessories using analytical methods in chemistry. (Apply)
CO3	Apply the use of equipment for the measurement pH of sample solutions to detect any potential environmental issues. (Apply)
CO4	Apply the use of equipment for the measurement of conductance of sample solutions to monitor and control the quality of the treated water. (Apply)
CO5	Analyze the probable corrosion, corrosion rate, and corrosion mechanism of the metallic material in the given environment. (Analyze)
Reference	Books (Physics)

- Physics Laboratory Manual, Department of Physics, Francis Xavier Engineering College, Tirunelveli.
- A Textbook of Engineering Physics Practical ,UNIVERSITY SCIENCE PRESS (An Imprint of Laxmi Publications Pvt. Ltd.)2nd edition.

Reference Books (Chemistry)

• J. Mendham, R.C. Denney, J.D.Barnes, M.Thomas and B.Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (5th edition 2009).

Web Resources (Physics)

Virtual Lab - https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html Young's Modulus- https://vlab.amrita.edu/?sub=1&brch=280&sim=550&cnt=1

Virtual Lab - https://www.vlab.co.in/ba-nptel-labs-physical-sciences

https://iitr.ac.in/Academics/static/Department/Physics/Thermal%20Physics%20Laboratory/To_study _the_characteristics_of_Solar_cell--_Current_voltage_spectral_and_illumination..pdf

Web Resources (Chemistry)

- Water Quality standards https://www.youtube.com/watch?v=OlGllOZlIyI
- Corrosion experiments weight loss method https://www.youtube.com/watch?v=SMlg WfdB
- Chem draw basics- https://youtu.be/a9r4Ofnc-Ro?si=IkzbsfFP_eUKBvU4

CO Vs PO Mapping and CO Vs PSO Mapping – Physics

СО	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P0 10	P0 11	PSO 1	PSO 2	PSO 3
1	3	2	1	3	3									
2	3	2	1	3	3									
3	3	2	1	3	3									
4	3	2	1	3	3		2							

5	3	2	2	3	3					

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P0 7	PO 8	PO 9	P0 10	P0 11	PSO 1	PSO 2	PSO 3
1	3	2	2			3	3	2						
2	3	2	2			3		2	2					
3	3	2	2			3		2	2					
4	3	2	2			3		2	2					
5	3	2	2			3	3	2	2					

CO Vs PO Mapping and CO Vs PSO Mapping - Chemistry

COURSE LEVEL ASSESSMENT QUESTIONS – PHYSICS

COURSE OUTCOME 1: Analyze the experimental data to determine thermal conductivity, enhancing their ability to understand and predict heat transfer in materials.(Analyze)

1. Determine the thermal conductivity of a given bad conductor (Glass) using Lee's disc method. (Given: M= 800 X10⁻³ Kg, S = 370 JKg⁻¹K⁻¹).

COURSE OUTCOME 2: Analyze the bending of materials under load and relate the observed deformation to material properties.(Analyze)

1. Find out the Young's modulus of the material of a beam using Non-Uniform bending method. (Given: Thickness of the beam d = 6.35 mm)

COURSE OUTCOME 3: Interpret the experimental results to calculate the Planck's constant and the work function, reinforcing their understanding of photoelectric principle.(Apply)

1. Determination of planck's constant and work function using the principle of photoelectric effect.

COURSE OUTCOME 4: Analyze the experimental data to develop practical skills and a deeper understanding of semiconductor devices, and use this knowledge to design new experiments in engineering. (Analyze)

- 1. Determination of band gap of a Semiconductor (Forbidden energy band gap kit).
- 2. Study the V-I characteristics of LED and laser diode

3. Find out the fill factor of a given solar cell.

COURSE OUTCOME 5: Gain a deeper understanding of the acoustic properties of liquids and enhance their practical laboratory skills. (Apply)

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.

COURSE CONTENT AND LECTURE SCHEDULE – PHYSICS

S.No.	ΤΟΡΙϹ	NO OF WEEKS REQUIRED
1	Determination of band gap of a Semiconductor diode (Forbidden energy band gap kit).	1
2	Determination of planck's constant and work function using the principle of photoelectric effect.	1
3	Determination of Young's modulus of the material-Non Uniform bending method.	1
4	Determination of thermal conductivity of a bad conductor – Lee's Disc method.	1
5	Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer	1
6	To find out the fill factor of a given solar cell.	1
7	To study V-I characteristics of LED and laser diodes.	1

ASSESSMENT QUESTIONS - CHEMISTRY

COURSE OUTCOME 1: Analyze the water quality related parameters quantitatively for industrial and fabrication processes. (Analyse)

1. You are the Quality Control Engineer at a manufacturing plant that produces precision metal components for the automotive industry. Your plant uses water extensively in various fabrication processes, including cooling systems, rinsing, and cleaning parts.Perform a hardness test on the given water sample using a titration method with EDTA (Ethylenediaminetetraacetic acid) as the titrant. Record the total hardness in ppm (parts per million) of calcium carbonate (CaCO₃).

COURSE OUTCOME 2: Interpret the use of equipment for the measurement of electrode potential of solutions. (Apply)

1. You are a quality control engineer working in a pharmaceutical company that produces iron supplements. To ensure that each batch meets regulatory standards and contains the correct amount of iron, you need to determine the iron content in a pharmaceutical sample using potentiometric titration. The sample contains ferrous sulfate (FeSO₄) as the iron source.

COURSE OUTCOME 3: Apply the use of equipment for the measurement pH of sample solutions to detect any potential environmental issues. (Apply)

1. You are an environmental scientist working on a project to monitor the pH of water sources in a nature reserve to ensure the ecosystem's health. Accurate pH measurements are crucial to detect any potential

environmental issues, such as acid rain or pollution. Analyse the given water sample with the use of a pH meter equipped by a glass electrode.

COURSE OUTCOME 4: Apply the use of equipment for the measurement of conductance of sample solutions to monitor and control the quality of the treated water. (Apply)

1. You are an engineering intern at a water treatment facility. The facility is implementing a new process to monitor and control the quality of the treated water. One of your tasks is to measure the conductance of various water samples using a conductivity meter to ensure that the treated water meets the required standards for ion content. Analyse given water sample with the use of a conductivity meter equipped by a conductivity cell.

COURSE OUTCOME 5: Analyze the probable corrosion, corrosion rate, and corrosion mechanism

of the metallic material in the given environment (Analyze)

1. You are an engineering consultant for a company that operates offshore oil rigs. One of the key components of the rig is a pipeline made of carbon steel, which transports crude oil from the seabed to the surface. The pipeline is exposed to a harsh marine environment, including saltwater, varying temperatures, and mechanical stresses. Your task is to analyze the probable corrosion and corrosion rate of the carbon steel pipeline in this environment.

S.No.	ΤΟΡΙϹ	NO OF WEEKS REQUIRED
1	Analysis of water sample(hardness) for industrial applications and fabrication processes.	1
2	Estimation of iron in pharmaceutical samples by Potentiometry (Electrochemical sensor).	1
3	Determination of acid concentration using pH metry.(pH sensor).	1
4	Utilization of conductometric analysis for determining the strength of solution.	1
5	Corrosion Experiments - weight loss method and potentiometry	1
6	Design a molecular structure using ChemDraw and a computational model.	1
7	Analysis of water (Alkalinity) for industrial and fabrication purposes.	1

COURSE CONTENT AND LECTURE SCHEDULE - CHEMISTRY

Prepared by Dr. R Suman, AP/Chemistry

Verified by

Mr. M. Robinson, AP/Chemistry Francis Xavier Engineering College/ Dept of AI& DS/R2024/Curriculum and Syllabi/VIII Board of Studies

24CS1511		L	Т	Р	С							
	PROGRAMMING PRACTICE LAB USING C	0	0	4	2							
Preamble												
The goal of enhance the approach ar new program	the practice lab is to provide the students with foundation in e problem solving skills related to the field of engineering. nong the students to solve real world problems thus provid nming languages	computer It enable ing the ba	r progr s the a se to b	ammi algori learn	ing to thmic other							
Prerequisite	s for the course											
• NIL												
Objectives												
1. To dev	velop C programs using conditional and looping statements											
2. To be	able to use arrays and strings in C											
3. To but	ild modular programs using functions in C											
4. To exp	blicitly manage memory using pointers in C											
5. To dev	velop applications in C using structures and files											
S. No	List of Experiments	CO										
1	Programs using simple statements		C01									
2	Programs using decision making statements		C01									

3	Programs using looping statements		C01	
4	Programs using one dimensional and two	o dimensional	CO2	
	Arrays			
5	Programs using strings.		C02	
6	Programs using user defined functions ar	nd recursive	CO3	
7	Programs using functions and pointers		C03	
8	Programs using structures and pointers		C04	
9	Programs using structures and unions		CO4	
10	Programs using file concept		C04	
S.No.	List of Projects		Related Experiment	СО
1.	Vaccine Status Registration System		Ex. 1 to 10	CO5
2.	Toll Bill Management system		Ex. 1 to 10	C05
3.	Voting Eligibility system	Ex. 1 to 10	C05	
4.	Cricket Scorecard Display system		Ex. 1 to 10	C05
5.	Medical History Viewing System		Ex. 1 to 10	CO5
6.	Bus/ Flight Ticket Reservation System		Ex. 1 to 10	C05
7.	Vehicle Parking Control System		Ex. 1 to 10	C05
8.	Canteen Menu Management System		Ex. 1 to 10	CO5
9.	Grocery Checklist Management System		Ex. 1 to 10	C05
10.	Diary Management System		Ex. 1 to 10	CO5
11.	Retail Shop Inventory Management Syste	em	Ex. 1 to 10	CO5
12.	Pharmacy Inventory System		Ex. 1 to 10	CO5
13.	Library Book Management System		Ex. 1 to 10	CO5
14.	Student Subject Selection System		Ex. 1 to 10	CO5
15.	Student Leave Application System		Ex. 1 to 10	CO5
Suggestive A	Assessment Methods			
Lab Compo	nents Assessments	End Semester	Exams	
(50 Marks)	(50 Marks)		
1 E		1 Decendric		
1. Exerci	t File (Progress Score)	1. Record no	le	
2. Flojec		2. Exercises		
5. VIVA V		J. 1100 0000		
Course Outco	omes			
Upon compl	etion of the course, the students will be a	ble to:		
C01	Implement program using control stateme	ents		
CO2	Implement arrays and perform string oper	rations		
CO3	Develop reusable modules, store data in m	ain memory effec	tively using poin	ters
C04	Form heterogeneous data using structures	s, union and files		

CO5 Build a project based on the required concepts learnt in C

Laboratory Requirements

- C compiler
- System with windows
- Internet

Reference Books

1. Reema Thareja, "Programming in C", Oxford University Press, Second edition, 2016

Web Resources

- 1. <u>https://www.hackerrank.com/</u>
- 2. <u>https://www.codechef.com/selflearning?itm_medium=navmenu&itm_campaign=learncp</u>
- 3. https://www.hackerearth.com/practice/basic-programming/input-output/basics-of-input
 - output/tutorial/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PSO1	PSO2	PSO3
1	3	3	3									1		
2	3	3	3									1		
3	3	3	3									2		
4	3	3	3									2		
5	2	2	2			1			2	2	2	3		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	Model Exam	END SEM EXAM
REMEMBER		
UNDERSTAND		
APPLY	50	100
ANALYZE		
EVALUATE		
CREATE	50	

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: (Blooms Category: Apply) (Problem Source: Code chef) Problem Statement:

Pooja would like to withdraw X \$US from an ATM. The cash machine will only accept the transaction if X is a multiple of 5, and Pooja's account balance has enough cash to perform

the withdrawal transaction (including bank charges). For each successful withdrawal the bank charges 0.50 \$US dollars. Calculate Pooja's account balance after an attempted transaction.

Input Constraints:

Positive integer 0 < X <= 2000 - the amount of cash which Pooja wishes to withdraw.

Nonnegative number $0 \le Y \le 2000$ with two digits of precision -To represent Pooja's initial account balance.

Output Constraints:

Output the account balance after the attempted transaction, given as a number with two digits of precision. If there is not enough money in the account to complete the transaction, output the current bank balance.

Example:

ТҮРЕ	INPUT		OUTPUT
Successful Transaction	30	120.00	89.50
Incorrect Withdrawal	42	120.00	120.00
Amount (not multiple of 5)			
Insufficient funds	300	120.00	120.00

COURSE OUTCOME 2: (Blooms Category: Apply) (Problem Source: Code chef) Problem Statement:

Write a program that takes in a letter class ID of a ship and display the equivalent string class description of the given ID. Use the table below.

Class ID	Ship Class
B or b	Battle Ship
Corc	Cruiser
D or d	Destroyer
F or f	Frigate

Input Constraints:

The first line contains an integer T, the total number of test cases. Then T lines follow, each line contains a character. $1 \le T \le 1000$

Output Constraints:

For each test case, display the Ship Class depending on ID, in a new line.

Example:

INPUT	OUTPUT
3	Battleship
В	Cruiser
С	Destroyer
D	

COURSE OUTCOME 3: (Blooms Category: Apply) (Problem Source: Hacker rank) Problem Statement:

Functions are a bunch of statements grouped together. A function is provided with zero or more arguments, and it executes the statements on it. Based on the return type, it either returns nothing (void) or something. For example, a function to read four variables and return the sum of them can be written as

int sum_of_four(int a, int b, int c, int d) {
 int sum = 0;
 sum += a;
 sum += b;
 sum += c;

sum += d; return sum;

+=: Add and assignment operator. It adds the right operand to the left operand and assigns the result to the left operand. So a += b is equivalent to a = a + b;

}

Task

Write a function int max_of_four(int a, int b, int c, int d) which reads four arguments and returns the greatest of them. Note that it is not built in max function in C. Code that will be reused is often put in a separate function that returns the greater of the two values. Input Constraints:

Input will contain four integers(one on each line)

Output Constraints:

Print the greatest of the four integers.

Sample Input: 3 4 6 5 Sample Output: 6

COURSE OUTCOME 4: (Blooms Category: Apply) (Problem Source: Hacker rank) Problem Statement:

You are transporting some boxes through a tunnel, where each box is a parallelepiped, and is characterized by its length, width and height. The height of the tunnel feet and the width can be assumed to be infinite. A box can be carried through the tunnel only if its height is strictly less than the tunnel's height. Find the volume of each box that can be successfully transported to the other end of the tunnel. Note: Boxes cannot be rotated.

Input Constraints:

The first line contains a single integer, denoting the number of boxes. Lines follow with three integers on each separated by single spaces, and which are length, width and height in feet of the box.

Output Constraints:

For every box which has a height lesser than 41 feet, print its volume in a separate line.

SAMI	PLE INPU	T	SAMPLE OUTPUT
4			
5	5	5	
1	2	40	125
10	5	41	80
7	2	42	

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED FOR EXERCISES	NO OF HOURS REQUIRED FOR PROJECT
1	Simple Statements	2	1
2	Decision Making Statements	2	1
3	Looping Statements	2	1
4	One Dimensional And Two Dimensional Arrays	2	1

5	Strings	2	1
6	Functions: User Defined Functions And Recursive Functions	2	1
7	Functions And Pointers	2	1
8	Structures And Pointers	2	1
9	Structures And Unions	2	1
10	Files Concept	2	1
11	Project Implementation & Integration	0	15
	Total	20	25
	Total Hours Required	4	5
Pı	Prepared by, Verified by,		

Dr. T.C.Subbu Lakshmi, Swaminathan,

Dr.G.Aravind

Prof/ CSE

Asso.Professor /IT

24GE1511		L	Τ	Р	C
	Engineering Practices Laboratory		0	4	2
Prerequisite	es for the course	I			
Basic	Science				
Objectives					
To pr	ovide exposure to the students with hands-on experience	e in vari	ious b	asic eng	gineering
practi	ces in Civil, Mechanical, Computer Science, Electrical, and	d Electr	onics	Engine	ering.
S.No	List of Experiments	СО			
	BASIC EMBEDDED SYSTEM (ECE)				
1	Control LED with Arduino Board and Tinker cad software.	C01			
2	Control LED with push button	C01			
3	Demonstrate RGB LED Color Mixing with Arduino in Tinker cad	C01			
4	Demonstrate LCD Display with Arduino.	C01			
5	Design a system to demonstrate a street traffic light system.			C01	

6	Read data from a sensor and experiment with both Analog and Digital sensors.	C01
7	Interface Soil Moisture Sensor with Arduino	C01
8	Interface Gas Sensor with Arduino	C01
9	Interface Ultrasonic Distance Sensor with Arduino	C01
10	Interface PIR Sensor with Arduino	C01
	ELECTRICAL BOOTH (EEE)	
11	Residential house wiring using switches, fuse,	CO2
12	Indicator, lamp, and energy meter.	<u> </u>
12	Stainease wining	<u> </u>
13	Staircase wiring	02
14	Measurement of electrical quantities – voltage, current, power in Electrical circuit.	CO2
15	Measurement of energy using a single phase energy meter	CO2
	ASSEMBLING AND DISMANTLING OF ELECTRICAL APPLIANCES (EEE)	
16	Dismantling and Assembling of Iron box	CO3
17	Dismantling and Assembling of fan	CO3
18	Dismantling and Assembling of Mixie	CO3
19	Dismantling and Assembling of Induction stove	CO3
20	Introduction to PLC programming	CO3
	BASIC CIVIL TOOLS AND SURVEYING (CIVIL)	
21	Introduction to Construction Tools	CO4
22	Visual inspection and Quality check on Bricks	CO4
23	Visual inspection and Quality check on Cement	CO4
24	Visual inspection and Quality check on Aggregates	CO4
25	Introduction to Surveying and Basic Tools	CO4
26	Field Measurements- Ranging and Marking	CO4
27	Detection and Correction of errors in field measurements	CO4

	OS INSTALLATION (CSE)	
28	Disk formatting, partitioning, and Disk operating system commands	C05
29	Install, upgrade, and configure Windows/Linux operating systems	C05
30	Installation of Dual OS	C05
31	Installation Antivirus and configure the antivirus	C05
32	Installation of printer and scanner software	C05
	ASSEMBLING & DISMANTLING OF COMPUTER HARDWARE (CSE)	
33	Assembly and Disassembly of hardware	C06
34	Troubleshooting and Managing Systems	C06
35	Study of basic network commands	C06
36	Establish network connections	C06
37	Remote desktop connections and file sharing	C06
	DESIGN & 3D PRINTING (MECHANICAL)	
38	Introduction to Additive Manufacturing and basic machine handling methodologies.	C07
39	Modeling Creative Designs in CAD Software.	C07
40	Generating STL files from the CAD Models & Working on STL files.	C07
41	Printing the part in STL format.	C07
42	Evaluating the fabricated part for its suitability to a given application in terms of its fit, surface finish & dimensional accuracy.	C07
	WELDING (MECHANICAL)	
43	Welding tools and techniques, preparation of butt joints.	C08
44	Preparation of lap and T Joints by shielded metal arc	C08
	weiding.	

C01	Interface Embedded Processors with I/O devices		
CO2	Carry out wiring and electrical measurements for residential installations.		
CO3	Carry out assembling and dismantling of electrical home appliances		
C04	Conduct quality checks on construction materials and error correction measurements	in field	
CO5	Install and configure Windows and Linux operating systems.		
C06	Identify the basic hardware components		
C07	Distinguish the basic concepts of additive manufacturing and its application	ations	
C08	Use welding equipment to join the structures and sheet metal works		
Labora	tory Requirements		
	ELECTRONICS		
1	Arduino UNO	30 Nos.	
2		Г oo ob	
2	Soil Moieture Sensor	5 each	
	Gas Sensor	5 each	
5	Illtrasonic Distance Sensor	5 each	
6	DID Songor	E oach	
0			
1	ELECTRICAL		
	Single and Two way Switches, Fuses,	10 each	
2	Voltmeter, Ammeter, Wattmeter, Energy meter	5 each	
3	IFON BOX, Fan Minia Induction Store	5 each	
4 5	DI C leit	2 oach	
5	Fluorescent lamp	5 oach	
0		Jeach	
1	Trowel Shovel and Pan	5 Nos	
2	Weighing balance	2 Nos.	
3	Measuring tape and cross staff	5 Nos.	
4	Arrows and Ranging rods	10 Nos.	
5	Marking twine	5 Nos.	
6	Chalk powder	10 kg	
	COMPUTER SCIENCE		
1	Computer System (Processor, RAM, HarddisK, Motherboard)	3 Nos	
2	OS setup in Pendrive	3 Nos	
3	Network Switch	1 Nos	
4	Jack crimped UTP Cable (3 metre)	10 Nos	
5	RJ 45 connector	6 Nos	
	MECHANICAL		

1	3D - Design software with systems	30		
2	3D printing machine	02		
3	Arc welding transformer with cables and holders	05		
4	Welding booth, accessories with exhaust facility	05		
Refer	ence Books			
1.	K.Jeyachandran, S.Natarajan & S, Balasubramanian, "A Primer on Engineering I	Practices		
	Laboratory", Anuradha Publications, (2007)			
2.	T.Jeyapoovan, M.Saravanapandian&S.Pranitha, "Engineering Practices Lab Mar	nual",		
	Vikas Publishing House Pvt. Ltd, (2006)			
3.	H.S. Bawa, "Workshop Practice", Tata McGraw – Hill Publishing Company Limit	ed, (2007)		
4.	4. A.Rajendra Prasad & P.M.M.S. Sarma, "Workshop Practice", Sree Sai Publication (2002)			
5.	5. Simon Monk, "Programming Arduino: Getting Started with Sketches" Mc Graw hill.2012			
6.	6. Gibson, I, Rosen, DW., and Stucker, B., Additive Manufacturing Methodologies: Rapid			
	Prototyping to Direct Digital Manufacturing, Springer, 2015			
7.	7. Dr. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain, Surveying (Volume –I and			
	II), Lakshmi Publications, 17th Edition, 2016			
8.	RON GILSTER , "PC Hardware: A Beginner's Guide". (CSE)			
9.	Chris Rhodes, MVP, Andrew Bettany, MVP, "Windows Installation and Update			
Wah	Troubleshooting". (CSE)			
web	resources			
https:	/youtube/EJEz6t5SpMw?si=dUvXVwj7_rcmd3jF			
https:	https://www.youtube.com/watch?v=wAjkSj3ZjLs			
https:	/www.youtube.com/watch?v=Zdj-nUY0fKk			
https:	/www.youtube.com/watch?v=yrAdEaLzIK4			
https:	//youtu.be/AmXBRzizPMI?si=tK4roYcYaBPDwXuf			
https:	https://youtu.be/kOUu7LJuV7M?si=fjkeHd86NHLPZdZp			
, î				

CO Vs PO	Mapping
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CO	P01	P02	P03	P04	P05	P06	P07	РО 8	P09	PO1 0	PO 11
1	3	3	3	3	3						
2	3	2	2	2	1	2		2	3		2
3	3	2	2	2	1	2		2	3		2
4	3	3	2	2	3				2		2
5	3	2	2	2							
6	3	3	3	2	1						

7						

Verified by, Ms. M. Renisha, AP/CIVIL

S. No	Course Code	Course Name	Category	Conduct Periods	L	Т	Р	С		
	Theory Courses									
1	24HS2101	TechnicalCommunication Skills	HSSM	2	2	0	0	2		
2	24MA2201	Complex Analysis and Fourier Series	BS	3	3	1	0	4		
3	24CS2501	Introduction to Computing using Python	ES	3	3	0	0	3		
4	24EE2501	Fundamentals of Electrical and Electronics Engineering	ES	3	3	0	0	3		
5	24ME1501	Engineering Graphics	ES	4	2	0	4	4		
6	24GE2901	Design Thinking	EEC	1	1	0	0	1		
7	24HS2103	Technology in Tamil Culture	HSSM	1	1	0	0	1		
		Practical Cours	ses							

Francis Xavier Engineering College | Dept of AI& DS | R2024 / Curriculum and Syllabi / VIII Board of Studies

1	24CS2511	Python Programming Laboratory	ES	4	0	0	4	2
2	24AI2611	Artificial Intelligence Tools Laboratory	РС	4	0	0	4	2
	•		Total	25	15	1	12	22

24HS2101	TECHNICAL COMMUNICATION SKILLS	L	Τ	Р	С
		2	0	0	2

Preamble

This course is offered to develop strategies and skills to enhance professional students' ability to read and comprehend engineering and technology texts. Foster their ability to write convincing job applications and effective reports. Develop their speaking skills to make technical presentations, participate in group discussions. The outcome of the course is to help students acquire the language skills of listening, speaking, reading and writing competency in English language thereby making them meet the global expectations.

Prerequisites for the course

• The prerequisite knowledge required to study this Course is the basic knowledge in English Language.

Objectives

- 1. To widen strategies and skills to augment ability to read and comprehend engineering and technology texts.
- 2. To draft convincing job applications and effective reports.
- 3. To develop speaking skills to make technical presentations, participate in group discussions.
- 4. To strengthen listening skills to comprehend technical lectures and talks in their areas of specialization.
- 5. To cultivate writing skills both technical and general.

	0	6	
UNIT 1		READING AND STUDY SKILLS	6

Reading - Reading longer technical texts / technical blogs and taking down notes; **Writing** - interpreting charts (all the types), graphs – comparing and contrasting statements/paragraphs – analyzing technical details - writing technical blogs - Drafting lab reports, writing clear and concise emails to professors and colleagues, composing technical summaries of research articles; **Vocabulary Development** - Select Technical Vocabulary; **Language Development** - Active Voice and Passive Voice

UNIT 2	INTRODUCTION TO PROFESSIONAL WRITING	
--------	--------------------------------------	--

Reading- Technical related topics; **Writing** - statement of purpose - press release – extended definitions - writing instructions – recommendations –Minutes of the Meeting - Writing - user manual development for a chosen engineering tool, safety protocol development for a specific engineering lab; **Language Development** - Subject Verb Agreement, Compound Words.

UNIT 3INTERVIEW SKILLS6Reading- newspaper article - read company profile - practice in speed reading ;Writing - Job

Application - Resume- Internship application - letter to the editor - email etiquette - positive, negative and neutral responses - sending professional emails; Writing opinion paragraph - Writing paragraphs with reasons; **Vocabulary Development** - select Technical Vocabulary; **Language Development** - If – Conditionals

UNIT 4	REPORT WRITING I	6

Reading- Analyzing research articles on emerging technologies in engineering, white papers on future engineering trends, identifying potential research opportunities; **Writing** - Fire Accident Report - Industrial Visit Report - Project Report; **Vocabulary Development**- finding suitable synonyms - paraphrasing; **Language Development** - Clauses.

UNIT 5	REPORT WRITING II	6

Reading - Analyzing project management documents, work breakdown structures (WBS), and Gantt charts, evaluating project feasibility and timelines; **Writing** - Writing Feasibility Reports, Survey Reports; **Vocabulary Development** - verbal analogies ;**Language Development** - Prepositional Phrases.

6
Total Periods 3									
Suggestive A	Assessment Methods								
Forr	native Assessment	Continuous Assessment	End	Semester Exams					
	(20 Marks)	(20 Marks)		(60 Marks)					
(i) Google Fo incorporatio Reading	orm based - on-line Test ng Listening, Speaking and	Written Test	,	Written Test					
Outcomes									
Upon completion of the course, the students will be able to:									
C01	Understand advanced tech engineering concepts and e	nnical texts from varied technic explore more. (Apply)	al genr	es to understand					
CO2	Review technical contents contents using the right articles published in repute	written on par with internation vocabulary without grammatica ed journals. (Apply)	al stano al erro	lards and rewrite rs to make their					
CO3	Develop polished resumes highlighting their qualifica employment opportunities	and job applications tailored to ations and enhancing their chan . (Apply)	specifionces of	c roles, effectively securing desired					
CO4	Write reports utilizing the standards using the exact v (Apply)	required format prescribed on pa rocabulary to make their reports v	r with i worthy	international to be read.					
CO5	Appraise the need for new the format prescribed in a	products and write feasibility and way to create awareness. (Apply)	d surve	y reports following					
Text Books									
 Mike Suma Limite Kuma 	Markrl. Technical Communiont,S and Joyce Pereira. Tec ed, 2014. r, Sanjay and PushpLata. Con ooks	cation,Palgrave Macmillan: Londo hnical English II. Chennai: Vijay mmunication Skills: A Workbook.	n, 2012 Nicole New D	2. • Imprints Private elhi: OUP, 2018.					
1. Ramai	n, Meenakshi&Sangeetha Sh	arma. Communication Skills. New	Delhi:	OUP, 2018					
2. Rizvi Publis	M, Ashraf. Effective Technic	al Communication. New Delhi: Ta 7	ta McG	raw-Hill					
Web Resource	ces	7							
1. Inter	pretation of Charts : <u>https://</u>	<u>youtu.be/4lxA7lo9GLU</u> :							
<u>https:</u>	//www.englishhints.com/cl	narts-and-graphs.html							
2. Instru	ctions <u>https://www.wikiho</u>	w.com/Write-Clear-Instructions							

- 3. Resume building <u>https://novoresume.com/career-blog/how-to-write-a-resume-guide</u>
- 4. Report writing <u>https://www.youtube.com/watch?v=FXIuHOFAxos</u>; <u>https://www.deakin.edu.au/students/studying/study-support/academic-skills/report-writing</u>
- 5. UPSC Interview: <u>https://www.youtube.com/watch?v=OhJWg-0qdI0</u>

CO Vs PO Mapping and CO Vs PSO Mapping

<u> </u>	PO	PS	PS	PS										
LU	1	2	3	4	5	6	7	8	9	10	11	01	02	03
1										3				
2										3				
										-				
3										3				
U										Ũ				
4										3				
· ·														
5										3				
										5				

SUGGESTED COURSE LEVEL ASSESSMENT QUESTIONS:

COURSE OUTCOME 1 (CO 1) :

- 1) Read the given passage and take notes.
- 2) Analyse the given type of chart or graph and answer the questions given.
- 3) Analyse the given chart or graph and write paragraphs comparing and contrasting the data.
- 4) Analyse the given chart or graph and write paragraphs giving importance to technical details.
- 5) Fill in the blank with appropriate technical vocabulary.
- 6) Convert the given active voice sentence into passive voice or impersonal passive voice.

COURSE OUTCOME 2 (CO 2) :

- 1) Write a purpose statement for the tool or gadget given.
- 2) Write an extended definition for the given word.
- 3) Write 8 instructions / recommendations on the given topic.
- 4) Write the Minutes of the meeting for the given meeting.
- 5) Fill in the blank with appropriate Subject Verb agreement.
- 6) Fill in the blank with suitable compound words.

COURSE OUTCOME 3 (CO 3) :

- 1) Listening to mock interviews and answering the questions.
- 2) Listen to the strategies of GD and answer the given questions.
- 3) Read and submit a recording of technical content following the strategies of speed reading.
- 4) Write Job application with a cover letter for the given job description.

5) Write paragraphs expressing opinion on the given topic.

6) Fill in the blank / complete the sentence with appropriate If-Conditionals.

COURSE OUTCOME 4 (CO 4) :

- 1) Write a fire accident report for the provided incident.
- 2) Write an Industrial visit report.
- 3) Write a report on the Project work undertaken by the candidate giving importance to the current status report and the time needed for the completion of the project.
- 4) Find the appropriate synonym for the given word.
- 5) Paraphrase the given passage.
- 6) Fill in the blank with appropriate clauses.

COURSE OUTCOME 5 (CO 5) :

- 1) Write a Feasibility report for a business / project proposal given.
- 2) Write a survey report for the given scenario.
- 3) Pick out the appropriate Verbal Analogy.
- 4) Fill in the blank with appropriate articles.
- 5) Complete the sentence with appropriate Prepositional Phrases.
- 6) Choose the appropriate word to complete the sentence.

Prepared by,

Verified by,

Mr. David Ayling J, AP/ English AP/English Ms. Thamizh Paavai,

24MA2201	COMPLEX ANALYSIS AND FOURIER SERIES	L	Т	Р	С
		3	1	0	4

Preamble:

The course consists of topics in Complex Integration, Partial Differential Equations and Laplace Transforms with applications to various engineering problems. This course will cover the following main topics: Construction of analytic function, Taylor's and Laurent's series, Poles and Residues, Half range sine series, Harmonic analysis, Fourier Series Solutions of one

Dimensional wave and heat flow equation and Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients.

Pre requisites for the course

24MA1201-Matrices and Advanced Calculus

Objectives					
1. To intro	oduce to th	ne concept of A	nalytical function		
2. To fami	iliarize wit	h Complex int	egration		
3. Tointro	oduceFour	ierseriesanaly	siswhichiscentraltomanyapplication	ons in	
enginee	ering field	and its use in	solving boundary value problems		
4. To acqu	uaint the st	tudent with PD	DE and Fourier series techniques in	solving	g wave
and hea	at flow pro	blems used in	various situations.		
5. To imp	rove the k	nowledge of La	aplace transforms.		0.2
UNITI	ANALYI	IC FUNCTION.	5		9+3
Definition of A	nalytic Fu	nction – Caucl	hy Riemann equations – Properties	s of ana	alytic functions – Jilno's
		mome conjuga	ate-construction of analytic function	л ру м	anne s
Thomson met	hod and b	llinear transfo	rmation- transformation w=1/z.		
UNIT II	COMPLE	X INTEGRATI	ON		9+3
Complex num formula and Laurent's serie proof).	bers and i its higher es – Types	ts conjugate-C order deriva of Singulariti	auchy's Integral theorem (without atives (without proof) and its ap es – Poles and Residues – Cauchy's	t proof oplicati s resid) – Cauchy's Integral ions – Taylor's and ue theorem (without
UNIT III	FOURIE	R SERIES			9+3
Dirichlet's co Half range sin	onditions - e series–H	- General Fou alf range cosin	rier series– Change of Intervals - ne series-Root mean square value-	Odd a Harmo	nd even functions – onic analysis
For Fourier se	eries-Engir	neering Applic	ations.		
UNIT IV	PDE A	ND APPLICAT	TIONS OF FOURIER SERIES		9+3
Classification o wave equation Engineering Ap	f PDE–Met n–Fourier oplications	hod of separat Series Solu	tion of variables- Fourier Series Sol tions of one dimensionalequati	lutions on of	of one dimensional heat conduction-
UNIT V		LAPLACE TR	ANSFORMS		9+3
Properties of	Laplace Ti	ransform-Inve	erse transforms-Convolution theor	rem(W	/ithout Proof)–
Partial fractior up to second	n-Applicati order with	ons of Laplace 1 constant coe	transforms for solving linear ordin fficients only -Engineering Applica	ary dif ations.	fferential equations
			Total Po	eriods	- 45+15=60Periods
			Sugges	stive A	ssessment Methods
Continuo	us Assessi	nent Test	Formative Assessment Test	Er	nd Semester Exams
([20Marks])	(20Marks)		(60Marks)
1.Descriptive	Questions		1.Assignment 2. Online Quizzes	1.De	scriptive Questions
Outcomes			1	1	

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

CO1:Apply Cauchy-Riemann equations to problems of fluid mechanics, thermodynamics and electro-magnetic fields. (Apply)

CO2: Solve complex valued integral functions using residues. (Apply)

CO3: Construct the Fourier series expansion of the periodic function. (Apply)

CO4: Solve the problems of one dimensional wave and heat equation. (Apply)

CO5:Apply Laplace transform technique to solve the given ordinary differential equations (Apply)

Text Books

- 1. B. S. Grewal, "Higher Engineering Mathematics", 45rdedition, 2017.
- Kreyszig. E, "Advanced Engineering Mathematics", John Wiley & Sons. Singapore 15th edition, 2017.
- 3. Glyn James, Advanced Modern Engineering Mathematics, Prentice Hall, 4th Edition, 2010.

Reference Books

1. N. P. Bali, Dr. Manish Goyal, A Text book of Engineering Mathematics, University Science Press, 9th Edition, 2016.

2. Advanced Engineering Mathematics, H.K.DASS, S. CHAND and Company Limited, New Delhi, 22ndrevised edition,2018.

3. Xin She Yang, Mathematical Modeling for Earth Science, Dunedin Academic Press, 2008.

Web Resources

- 1. Analytic functions-<u>https://youtu.be/b5VUnapu-qs</u>
- 2. Complex Integration-<u>https://youtu.be/4yC4IXcMKJg</u>
- 3. Fourier series <u>https://youtu.be/LGxE_yZYigI</u>
- 5. Applications of Fourier series-<u>https://youtube/YfGHNdVeyB4</u>
- 6. Laplace Transform <u>https://youtu.be/c9NibpoQjDk</u>

COURSE LEVEL SAMPLE QUESTIONS:

COURSE OUTCOME (CO 1) :

 In designing electrical circuits, sometimes it's necessary to map components from one domain to another. Consider a scenario where you have a circuit represented in the complex plane

Identify the critical points of this transformation $w = z^2$.

2) Consider a complex-valued function f(z) = (2x + ay) + i(4x + by) where z is a complex number. For what values of a and b the function f(z) is analytic.

COURSE OUTCOME (CO 2):

1) Consider a structural analysis project where historical data suggests that the behavior of a

structure under weather conditions follows a Cauchy sequence of the function

 $f(z) = \frac{z}{(z-1)(z-2)^2}$ over the region |z-2| = 1/2. The project aims to model the system and make predictions about the structure's response in the coming decades

(i) In what aspects of the structural response can be effectively captured over the region |z - 2| = 1/2.

(ii) Explore the convergence point of the structure?

2) In investigating the flow of fluid around an obstacle in a closed channel.

You need to calculate the circulation of the fluid around the obstacle to understand

its impact on the overall flow pattern

(i) Discuss how the function $f(z) = \frac{1}{(z^2+4)^2}$ arises in the fluid dynamics scenario described by the poles and its relevance to the circulation calculation interms of order.

(ii)Calculate the residues of at its poles |z - i| = 2.

COURSE OUTCOME (CO 3) :

1) Finding the Fourier series representation of a periodic function f(x) defined over the interval $0 \le x \le 2\pi$. The function is given as follows:

 $\begin{cases} x, & in (0,\pi) \\ 2\pi - x & in (\pi, 2\pi) \end{cases}$

(i) Determine the period (T) of the function f(x).

(ii) Calculate the coefficients (a_0, a_n, b_n) for the Fourier series of f(x).

(iii) Write the Fourier series representation for f(x).

(iv)Deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{\pi^2}{8}$.

2)Suppose we have to find the half – range sine series for the function f(x) = 1 in the interval (0, l), we need to,

a) Check whether it is odd or even function.

b) Determine the coefficients for the sine series.

COURSE OUTCOME (CO 4) :

1)By following this scenario explanation, to determine the steady-state temperature of the rod under the given conditions. One end of the rod of length 10cm is kept at 30°C and other end of the rod is kept at 50°C until steady state condition prevails.

2) The scenario describes the motion of a string that is stretched and fastened at two points x=0 and x=1 units apart. The motion of the string is initiated by displacing it according to the function $y=k(lx-x^2)$ where y represents the displacement of the string at a given point x, "k" is a constant determining the amplitude of the displacement, and" l" is a parameter determining the wave length of the displacement pattern.



i)The equation of motion of the string is ------.

ii) The boundary conditions are------

iii)The suitable solution is ------

iv)Apply the boundary conditions and determine the constant values.

v)The most general solution is------.

v)The equation for the motion of the string using half range sine series is ------.

COURSE OUTCOME (CO 5) :

1) An engineer working on the design of a control system for a mechanical system. The system's behaviour is described by a differential equation involving f(t) which represents a specific input signal, here the system responds based on laplace transform

(a) if the specific input signal $f(t) = e^{-2t} + t^2$ then describe the system responds

2) How would you apply the Laplace transform to analyze the vibrational response of the mechanical system described by $\frac{e^{-at}-e^{-bt}}{t}$?

CO Vs PO Mapping and CO Vs PSO Mapping:

	PS	0s											
СО	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO1 0	P01 1	PSO1	PSO 2
C01	3	3		2								1	
CO2	3	2		2								1	
CO3	3	2		2								1	

CO4	3	2	2				1	
CO5	3	2	1				1	

NPTEL/SWAYAM Course:

S. No.	NPTEL Course Name	Instructor	Host Institute
1.	Engineering Mathematics – II	Prof. Jitendra Kumar	IIT Kharagpur

Prepared by,

Verified by,

Dr. M Ayyappan, Asso. Prof/Maths

A. Santiago Stephen, Asso. Prof/Maths

24CS2501	INTRODUCTION TO COMPUTING USING PYTHON	L	Т	Р	С
		3	0	0	3

Preamble

This course provides learners an insight into Python programming, and develop programming skills to manage the development of software systems. The Python Programming course is designed to equip students with a comprehensive understanding of Python, a versatile and widely-used programming language. Covering fundamentals to advanced topics, this course includes Python syntax, data structures, functions, object-oriented programming, file handling, and database operations. Students will also explore data science libraries, GUI development with Tkinter, Image processing and web development thereby enabling them to apply Python in various real-world scenarios.

Prerequisites for the Course

Objectives		
1. Understand	l Python syntax, control flow, and input/output operations pr	oficiently.
2. Apply data recursion a	structures like lists, tuples, dictionaries, and sets, along with f and lambda functions effectively.	functions including
Master obje polymorph	ect-oriented programming principles, implementing classes, in ism, and encapsulation in Python.	nheritance,
4. Manipulate	files, handle exceptions, and organize code into modules and	packages adeptly.
5. Utilize Pyth visualizatio	on libraries such as NumPy, Pandas, Matplotlib, Tkinter, data on, GUI development, and database interaction with proficienc	analysis, y.
UNIT I	INTRODUCTION TO PYTHON PROGRAMMING	9
Overview of Pytl keywords – Da Input/Output – in	non Programming language – Python Interpreter and Envir ta types- Variables and Identifiers – Statements - Ope nport statement - Control flow - Decision making – Loop cont	onment –Basic syntax rators– Expression – rol structure.
UNIT II	DATA STRUCTURES AND FUNCTIONS	9
Data structures	: Lists – Tuples – Dictionaries - sets – Stack – Queue -	Working with Strings
Lambda Function	- Scope of variables	on – Anonymous and
Lambda Functior	OBJECT ORIENTED PROGRAMMING CONCEPTS	on – Anonymous and 9
Lambda Function UNIT III Introduction to Inheritance – Po Class methods, In	 Beneficially Parameters , return values – Recursion - Scope of variables OBJECT ORIENTED PROGRAMMING CONCEPTS OOP concepts – Classes – Instance variables - Objects – so lymorphism –Overloading – operator overloading - Overriconstance methods and static methods. 	on – Anonymous and 9 copes – namespaces - ling - Encapsulation –
Lambda Function UNIT III Introduction to Inheritance – Po Class methods, In UNIT IV	 Beneficially Parameters , return values – Recursion - Scope of variables OBJECT ORIENTED PROGRAMMING CONCEPTS OOP concepts – Classes – Instance variables - Objects – so lymorphism –Overloading – operator overloading - Overriconstance methods and static methods. FILES AND MODULES 	on – Anonymous and 9 copes – namespaces - ling - Encapsulation – 9
Lambda Function UNIT III Introduction to Inheritance – Po Class methods, In UNIT IV Introduction to F Exceptions – Use	 General Content of Carl, Parameters , return values – Recursion – Scope of variables OBJECT ORIENTED PROGRAMMING CONCEPTS OOP concepts – Classes – Instance variables - Objects – see lymorphism –Overloading – operator overloading - Overrice stance methods and static methods. FILES AND MODULES Files – File Modes – Reading, Writing Files and appending fir-defined and system Exceptions. 	on – Anonymous and 9 copes – namespaces – ling - Encapsulation – 9 les– Errors - Handling
Lambda Function UNIT III Introduction to Inheritance – Po Class methods, In UNIT IV Introduction to H Exceptions – User Introduction to H modules	 Generation (and Parameters , return values – Recursion – Scope of variables OBJECT ORIENTED PROGRAMMING CONCEPTS OOP concepts – Classes – Instance variables - Objects – see lymorphism –Overloading – operator overloading - Overrice stance methods and static methods. FILES AND MODULES Files – File Modes – Reading, Writing Files and appending fir-defined and system Exceptions. Modules and Packages – creating and importing modules – 	on – Anonymous and 9 copes – namespaces – ling - Encapsulation – 9 les– Errors - Handling Built-in and External
Lambda Function UNIT III Introduction to Inheritance – Po Class methods, In UNIT IV Introduction to F Exceptions – User Introduction to I modules UNIT V	 Generation (and Parameters , return values – Recursion – Scope of variables OBJECT ORIENTED PROGRAMMING CONCEPTS OOP concepts – Classes – Instance variables - Objects – see lymorphism –Overloading – operator overloading - Overrice stance methods and static methods. FILES AND MODULES Files – File Modes – Reading, Writing Files and appending files r-defined and system Exceptions. Modules and Packages – creating and importing modules – PYTHON LIBRARIES AND FRAMEWORKS 	on – Anonymous and 9 copes – namespaces - ling - Encapsulation – 9 les– Errors - Handling Built-in and External 9
Lambda Function UNIT III Introduction to Inheritance – Po Class methods, In UNIT IV Introduction to F Exceptions – Use Introduction to F modules UNIT V Data set –Data preprocessing Da Data base - Basi development & I	 Gope of variables OBJECT ORIENTED PROGRAMMING CONCEPTS OOP concepts – Classes – Instance variables - Objects – so lymorphism –Overloading – operator overloading - Overric stance methods and static methods. FILES AND MODULES Files – File Modes – Reading, Writing Files and appending fir-defined and system Exceptions. Modules and Packages – creating and importing modules – PYTHON LIBRARIES AND FRAMEWORKS science libraries – Numpy, Pandas and Matplotlib – Wor ta sets – Data Analysis and Visualization - GUI programming c operations on Databases – Interfacing Database with GUI mage processing Libraries with python. 	on – Anonymous and 9 copes – namespaces – ling - Encapsulation – 9 les– Errors - Handling Built-in and External 9 king with Datasets – with Tkinter Library – – Introduction to web

Laboratory Requirements

• 60 Systems with Windows / LINUX operating system with python IDLE or equivalent.

Suggestive Assessment

ContinuousAssessmentTest	FormativeAssessment Test	EndSemesterExams
(30Marks)	(10Marks)	(60Marks)
1. DESCRIPTIVE QUESTIONS	1. LAB EXPERIMENTS	1. DESCRIPTIVE
2. Programming Exercises	2. MODEL EXAMINATION	QUESTIONS

Outcomes

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

CO1: Apply basic control flow mechanisms, and demonstrate proficiency in performing input/output operations.

CO2: Demonstrate the data structures effectively and implement functions

CO3: Apply OOP concepts to design and implement Python classes with appropriate methods and attributes.

CO4: Manipulate files, handle exceptions effectively, and organize Python code into modules and packages.

CO5: Demonstrate applications using popular Python libraries and frameworks.

Text Books

- 1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second Edition, Shroff/O'Reilly Publishers, 2016(Unit I -IV)
- 2. Jake VanderPlas, Python Data Science Handbook, Oreilly Media, First Edition, 2016. (Unit V)

Reference Books

- 1. Charles Dierbach, "Introduction to Computer Science using Python", Wiley India Edition, 2016.
- 2. David Beazley and Brian K. Jones , "Python Cookbook", Oreilly Media, Third Edition, 2013. (Unit V)

Web Resources

- Python for Data science https://onlinecourses.nptel.ac.in/noc20_cs36/course (Unit III Numpy, Pandas)
- 2. https://www.geeksforgeeks.org(Unit V)

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PSO1	PSO2	PSO3
1	2	2	2	1	1								3	
2	1	2	1	1	1								3	
3	1	2	1	1	1								3	
4	1	1	1	2	1								2	
5	2	2	2	2	1								2	

CO Vs PO Mapping and CO Vs PSO Mapping

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	Lab Components	Model Exam	END SEM EXAM
REMEMBER	10	10			10
UNDERSTAND	10	10			20
APPLY	80	80	100	100	70
ANALYZE					
EVALUATE					
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Write a Python Program to read the unit of electricity consumed in a house and calculate the amount to be paid for the electricity consumed. The bill amount should be calculated as per the given specification:
- a. For 0 to 100 units the per unit is $\gtrless 0/-$

- b. For 0 to 200 units, for the first 100 unit the per unit cost is zero and the next 100 units, the consumer shall pay ₹ 1.5 per unit.
 - c. For 0 to 500 units, the consumer shall pay ₹ 0 for the first 100 units, for the next 100 units the consumer shall pay ₹ 2 per unit, for the next 300 units the unit cost is ₹3.00/- (Apply)
 - 2. Chef and Chefina are at positions X and Y on a number line. They both love badminton. It is known that badminton courts are located at every integer point. They want to find a court such that the maximum distance travelled by either of them is **minimized**. Formally, suppose they choose the badminton court at position Z. You need to find the minimum value of max(|X-Z|, |Y-Z|)max(|X-Z|,|Y-Z|) across all possible choices of Z. Here, |X| denotes absolute value of X. Write a Python Program to Report this minimum value.

Input Format

The first line of input will contain a single integer T, denoting the number of test cases.

Each test case consists of two space-separated integers Xand Y.

Output Format

For each test case, output the minimum possible value of $\max(|X-Z|, |Y-Z|)\max(|X-Z|, |Y-Z|)$.

Constraints

1≤T≤1000

 $1 \le X, Y \le 1000$

X<=Y

Sample :

Input

4

35

- 76
- 1 10

Output

1

1

1

5

16

 Develop a Python Program to Check if a Date is Valid and Print the Incremented Date if it is. (Apply)

COURSE OUTCOME 2:

1. Write a Python Program to Read a Number n and Compute n+nn+nnn. (Apply)

2. Write a program to find Sum of Digit of a Number using Recursion in Python. (Apply)

3. Differentiate break and continue. (Understand)

COURSE OUTCOME 3:

1. Develop Python programs using OOP principles (Understand, Apply)

2. Describe the various features of the Object-Oriented Programming Language. (Understand)

3. Develop a Python program to generate student class to calculate the student performance based on the following criteria: Above 75 percentage as Distinction, 60 to 74 percentage as First Class and Below 60 percentage as Second class. (Apply)4. Write a Python program to sort set of names stored in an array in alphabetical order. (Apply)

COURSE OUTCOME 4:

1. What happens if the file is not found in the following Python code? (Apply)

a=False

while not a:

try:

f_n = input("Enter file name")

 $i_f = open(f_n, 'r')$

except:

print("Input file not found")

2. Write a Python Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File. (Apply)

3. Write a Python Program to Extract Numbers from Text File. (Apply)

4. Write a Python Program to merge two files into a third file. (Apply)

COURSE OUTCOME 5:

1. Write a python program to convert RGB image to Black and white Image. (Apply)

2. How will you program GUI with Tkinter Library? Explain. (Understand)

Prepared by,

Verified by,

Francis Xavier Engineering College | Dept of AI& DS | R2024 / Curriculum and Syllabi / VIII Board of Studies

24FE2501	FUNDAMENTALS OF ELECTRICAL AND	L	T	Р	C				
24112301	ELEC I KONICS ENGINEERING	3	0	0	3				
Prerequisites for the course									
Engineering Physics									
• Enginee	ering Mathematics								
Course Objectives									
Dr.T.C.Subbu Lakshmi, Dr.G.Aravind Swaminatha									

Asso.Professor /IT

Prof/ CSE

The course will enable students to:

- Know the basic concepts of electric circuits and analysis and introduction to measurement and metering equipment's for electric circuits
- Gain knowledge on the basic operation of electric machines and transformers.
- Have an Introduction of semiconductor devices and its applications.
- To understand the fundamentals of digital electronics.
- Learn about the basics of communication systems.

UNITI	E	LECTRICAL CIRCUITS		9		
Ohms Law– I	Kirchoff's Laws– St	eady State Solution of DC Circuit	s –Mesh	and Node Analysis-		
Introduction to	AC Circuits –Operat	ing Principles of Moving Coil and M	Ioving Ire	on Instruments,		
Wattmeter and	Energy meter.					
UNITII	ELECTRICAL M	IACHINES		9		
DC Generator-	DC Motor- Single	Phase Transformer - single phase	induction	Motor:		
Construction, I	Principle of Operation	, EMF Equation and Applications.				
UNITIII	SEMICONDUCT	ORDEVICESANDAPPLICATIO	NS	9		
Characteristics Junction Trans	of PN Junction Dio istor: CB, CE, CC Co	de and Zener Diode– Half wave and onfigurations and Characteristics.	d Full wa	ve Rectifier –Bipolar		
UNITIV	DIGITALELECT	RONICS		9		
Number System	m –Number System	Conversions – Logic Gates- Half an	d Full Ac	lders–Half Subtractor		
and Full Subtra	actor - Introduction to	Flip-Flops: SR, JK, T, D.				
UNITV	BASICS OF COM	IMUNICATION SYSTEMS		9		
Types of Signa	lls: Analog and Digit	al Signals – Modulation: Amplitude	and Freq	uency		
Modulation - I	Demodulation-Comm	unication Systems: Radio, TV, Satel	llite (Bloc	ek Diagram Approach		
only)						
		Total	Periods	45		
Suggestive As	ssessment Methods			1		
Continuous	Assessment Test	Formative Assessment Test	Enc	l Semester		
(30	Marks)	(10 Marks)		Exams (60		
				Marks)		
1.DESCRIPTION OUESTIONS 1.ASSIGNMENT 1.DESCRIPTION						

2 EODMATIVE MILLTIDLE								
2.FORWATIVE WIDETIFLE	2.ONLINE QUIZZES	QUESTIONS						
CHOICE QUESTIONS	3.PROBLEM-SOLVING	2.FORMATIVE MULTIPLE						
	ACTIVITIES	CHOICE QUESTIONS						
CourseOutcomes								
Upon completion of the course,	the students will be able to:							
CO1: Apply the basics of electric c	CO1: Apply the basics of electric circuits, analysis, measurement and metering for electric circuits.							
CO2 : Understand the construction, single-phase induction motor.	operating principle of DC machine,	, single phase transformer and						
CO3:Understand the basic structu	re of electronic devices such as die	odes, Rectifiers and transistor.						
CO4: Analyze the various number	systems and simplifications using	mathematical expression						
and understand the concepts of fli	pflops.							
CO5: Understand the basics of co	mmunication systems.							
TextBooks								
2. R. Sedha, "Applied Electronics", S. Chand & Co., 2019.								
ReferenceBooks								
ReferenceBooks 1. MittleandV.N.Mittle,"E 2005. 2. T.K.Nagsarkarand, M.S.	BasicElectricalEngineering",Tata	McGrawHillEdition,NewDelhi,						
ReferenceBooks 1. MittleandV.N.Mittle,"E 2005. 2. T K Nagsarkarand, M S	BasicElectricalEngineering",Tata S Sukhija, "Basics of Electrical F	McGrawHillEdition,NewDelhi, Engineering", Oxfordpress2005.						
ReferenceBooks 1. MittleandV.N.Mittle,"E 2005. 2. T K Nagsarkarand, M S WebResources	BasicElectricalEngineering",Tata S Sukhija, "Basics of Electrical F	McGrawHillEdition,NewDelhi, Engineering", Oxfordpress2005.						
ReferenceBooks1. MittleandV.N.Mittle,"E 2005.2. T K Nagsarkarand, M SWebResources1. https://nptel.ac.in/courses	BasicElectricalEngineering",Tata S Sukhija, "Basics of Electrical E /108/104/108104139/	McGrawHillEdition,NewDelhi, Engineering", Oxfordpress2005.						
ReferenceBooks 1. MittleandV.N.Mittle,"E 2005. 2. T K Nagsarkarand, M S WebResources 1. <u>https://nptel.ac.in/courses</u> 2. <u>https://nptel.ac.in/courses</u>	BasicElectricalEngineering",Tata S Sukhija, "Basics of Electrical E / <u>108/104/108104139/</u> / <u>108/105/108105155/</u>	McGrawHillEdition,NewDelhi, Engineering", Oxfordpress2005.						
ReferenceBooks 1. MittleandV.N.Mittle,"E 2005. 2. T K Nagsarkarand, M S WebResources 1. <u>https://nptel.ac.in/courses</u> 2. <u>https://nptel.ac.in/courses</u> 3. <u>https://nptel.ac.in/courses</u>	BasicElectricalEngineering",Tata S Sukhija, "Basics of Electrical F /108/104/108104139/ /108/105/108105155/ /108/105/108105132/	McGrawHillEdition,NewDelhi, Engineering", Oxfordpress2005.						
ReferenceBooks 1. MittleandV.N.Mittle,"E 2005. 2. T K Nagsarkarand, M S WebResources 1. <u>https://nptel.ac.in/courses 2. <u>https://nptel.ac.in/courses 3. <u>https://nptel.ac.in/courses 4. <u>https://nptel.ac.in/courses </u></u></u></u>	BasicElectricalEngineering",Tata S Sukhija, "Basics of Electrical F /108/104/108104139/ /108/105/108105155/ /108/105/108105132/ /117/102/117102061/	McGrawHillEdition,NewDelhi, Engineering", Oxfordpress2005.						
ReferenceBooks 1. MittleandV.N.Mittle,"E 2005. 2. T K Nagsarkarand, M S WebResources 1. <u>https://nptel.ac.in/courses</u> 2. <u>https://nptel.ac.in/courses</u> 3. <u>https://nptel.ac.in/courses</u> 4. <u>https://nptel.ac.in/courses</u>	BasicElectricalEngineering",Tata S Sukhija, "Basics of Electrical F /108/104/108104139/ /108/105/108105155/ /108/105/108105132/ /117/102/117102061/	McGrawHillEdition,NewDelhi, Engineering", Oxfordpress2005.						

CO	РО	РО	РО	РО	PO	PO	РО	PO	РО	PO1	PO1	PO1	PSO	PSO
	1	2	3	4	5	6	7	8	9	0	1	2	1	2

1	3	3	3			
2	3	2		2	2	3
3	3					
4	3	3	2			2
5	3			2	2	

BLOOMSLEVELASSESSMENTPATTERN

BLOOMS CATEGOR Y	CAT1	CAT2	FAT1	FAT2	END SEME XAM
REMEMBER	30	30	05	05	20
UNDERSTAND	20	20	10	10	20
APPLY	20	20	05	05	30
ANALYZE	30	30	05	05	30
EVALUATE					
CREATE					

COURSELEVEL ASSESSMENTQUESTIONS

COURSE OUTCOME 1: Apply the basic properties of electrical elements, and

Analyze AC and DC circuit, and measurement and metering for electric

circuits.

- 1. Classify different electrical measuring equipment's and understanding their principles.
- 2. Determine current in 50hm resistor by any one method



COURSE OUTCOME 2:

- 1. Explain operative principle of transformer with background of magnetic circuits
- 2. Explain the construction, working principle of single phase Induction motor

COURSEOUTCOME3: Understand the utilization of semiconductor devices.

- 1. Explain CB configuration with the help of input and output characteristics.
- With a neat diagram explain the working of a PN junction diode in forward bias and reverse bias and show the effect of temperature on its V-I characteristics.

COURSEOUTCOME4: Understand the fundamentals of digital circuits.

- 3. Write short notes on i)RS flip flop ii)D- flip flop, iii) JK flip flop, iv)T-flip flop
- 4. Explain the working of half adder and full adder using truth table.

COURSEOUTCOME5:Understandthebasicsofcommunicationsystems.

- **5.** Discuss the usage of satellite for long distance communication with a neat block diagram ofbasic satellite transponder.
- 6. Explain the types of analog modulation with neat diagrams.

Prepared by, Mrs. S. Lakshmi, AP/EEE Verified by, Mr. N. V. Selvam, AP/EEE

		L	Т	Р	С			
24ME1502	ENGINEERINGGRAPHICS	2	0	4	4			
Prerequisites	for thecourse							
NIL								
Preamble								
Engineering d isthe language theengineerwl	rawing is an important tool for all Engineers and for many other e of Engineers. Engineering Drawing communicates all needed nodesignedaparttotheworkerswhowillmanufactureit.	ers pr l info	rofess ormat	siona ion	ls. It from			
Objectives								
 Tound Toimp Toexperiment Todevery Products. 	erstandtheimportanceofthedrawinginEngineeringapplications. rovetheirvisualizationskillssothattheycanapplythisskillindevelopir osethemtoexistingstandardsrelatedtotechnicaldrawings. elopgraphicskillsforcommunicationofconcepts,ideas,anddesignof E	ıgnew ngine	vprod eering	ucts				
CONCEPTSANDCONVENTION								
Importance of conventionsan	graphics in Engineering applications – Use of drafting instruments dspecifications –Size,layoutofdrawingsheets–LetteringandDimens	– BIS ioninį	g					
UNITI	PROJECTIONOFPOINTS, LINES ANDPLANES			1	2			
General Princ fourquadrants Projection ofpl	iples of orthographic projection – First Angle Projection, proj – Projection of straight lines located in the first quadrant – inclir lanes (Change ofpositionmethodonly).	ectior red to	n of both	poin ı pla	ts in nes –			
UNITII	PROJECTIONOFSOLIDS			1	.0			
Projectionofsin plane by chang	nplesolidslikeprisms,pyramids,cylinder,andconewhentheaxisisincl ge of position method.	inedt	oone	refer	ence			
UNITIII	SECTIONSOFSOLIDSANDDEVELOPMENTOFSURFACES			1	2			
Sectionsofregu Constructingse Developmento	larsolidsasperBISconventions- ectionalviewsofsimpleobjectsandcomponents- flateralsurfacesofregularsolids-Projectionoftruncatedsolids.							
UNITIV	INTERSECTION OF SOLIDS			1	2			
Line of interse	Line of intersection, Determining the line of intersection between surfaces of two interpenetrating							
two square pri	sms and Intersection of two cylinders with axes of the solids inters	ectin	g eacl	n oth	er			
Perpendicular	ly, using line method.							

UNITV ISOME	TRIC AND PERSPECTIVE PROJECTIONS	12			
Principlesofisometric pyramids,cylinders,ar method.	projection, isometricscale,isometricprojection, or prisms	ectionsofsimplesolids,truncatedprisms, , pyramids, and cylinders by visual ray			
TextBooks					
1. Venugor (P)Limited(2022	oalK.andPrabhuRajaV.,"Engineeringdrawi ?)	ng+AutoCAD",NewAgeInternational			
2. Natrajai (2015)	ıK.V.,"AtextbookofEngineeringGraphics",l	DhanalakshmiPublishers,Chennai			
ReferenceBook	S				
1. N.D.Bh 2. Kumai 3. Partha NewDelhi, (2015	att,"EngineeringGraphics",CharotorPubli M.S.,"EngineeringGraphics",D.D.Publicati sarathyN.S.andVelaMurali,"EngineeringG 5)	shingHouse,53RDEdition2019 ons,(2015) raphics",OxfordUniversity,Press,			
4. ShahM PublicationofB	.B.andRanaB.C.,"EngineeringDrawing",Pe areauofIndianStandards:	arsonEducation(2009)			
1. IS10711 2. IS9609(3. IS10714 4. IS11669 5. IS15021	–2001:TechnicalproductsDocumentation Parts0and 1)–2001:TechnicalproductsDo (Part20)–2001andSP46–2003:Linesforte –1986andSP46–2003:DimensioningofTec (Parts1to4)–2001:Technicaldrawings–P	–Sizeandlayoutofdrawingsheets cumentation–Lettering chnicaldrawings chnicalDrawings projectionMethods			
WebRecourses					
1. <u>http://n</u> 2. https://	<u>ptel.ac.in/courses/112103019</u> archive.nptel.ac.in/courses/112/105/112	2105294/			
SuggestiveAssessme	ntMethods				
CAT1 (20Marks)	Formative Assessment Test (20 Marks)	End Semester Exams(60Marks)			
CAT 1 10 MARKS Assignment, Multiple Choice Questions Descriptive type Questions					

Outcomes

CAT 2 10 MARKS

Uponcompletionofthecourse,thestudentswillbeableto:

C112.1:Applytheprinciplesoforthographicprojectioninconstructionofpoints,lines andplanes

C112.2: Apply the principles of change of position method in projection of simple solids

C112.3: Developprojectionsofsectionedsolidsandtheirdevelopmentalsurface.

C112.4: Construct the intersection of curves of simple solids

C112.5: Develop the isometric and perspective view of simple solids.

COVs PO MappingandCOVsPSOMapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PSO1	PSO2
112.1	3	1	1	2								3	2
1122	3	1	1	1	1							3	2
112.3	3	1	1	1	1							3	2
112.4	2	2	1	1	1							3	1
112.5	2	2	1	1	1							3	2

BLOOMSLEVELASSESSMENTPATTERN

BLOOMSCATEGORY	CAT1	CAT2	FAT 1	FAT 2	ENDSEMEXAM
REMEMBER					
UNDERSTAND			5	5	
APPLY	100	100	10	10	100
ANALYZE			10		
EVALUATE					
CREATE				10	

COURSELEVELASSESSMENTQUESTIONS

COURSEOUTCOME1:Apply the principles of orthographic projection in construction of points, lines and planes

1. Draw the projections of the following points on a common reference line. (Apply)A,35mmabove HP and25mm in front of VP B,40 mm below HP and 15mm behind VPC,50 mm above HP and 25 mm behind VPD,45 mm below HP and 25 mm behind VPE, 30mmbehindVP and on HP

2. A line CD measuring 80mm is inclined at an angle of 30° to HP and 45° to VP. The point C is20 mm above HPand30mminfrontofVP. Draw the projections of the straight line.(Apply)

3. A pentagon of side 30 mm rests on the ground on one of its corners with the sides containing the corner being equally inclined to the ground. The side opposite to the corner on which it rest is inclined at 30° to the VP and is parallel to the HP. The surface of the pentagon makes 50° with the ground. Draw the top and front views of the pentagon.

COURSEOUTCOME2: Applytheprinciples of change of position method in projections of solid problems and draw graphically

1. A pentagonal pyramid of base side 25mm and height 40 mm, is resting on the ground on one of its triangular faces. The base edge of that face is inclined 30o to VP. Draw the projections of the solid. (A)

2. A hexagonal prism has side 25mm and height 50mm has a corner of its base on the ground and the long edge containing that corner inclined at 300 to HP and 450 to VP. Draw the projections of the solid. (A)

COURSEOUTCOME3: Developprojections of sectioned solids and their developm ental surface.

3. A cylinder of base diameter 50mm and height 60mm rest on its base on HP. It is cut by a plane perpendicular to VP and inclined at 450 to HP. The cutting plane meets the axis at a distance 15mm from its top base. Draw the sectional plan and true shape of the section. (A)

4. A regular hexagonal pyramid side of base 30 mm and height 60 mm is vertically on its base on HP, such that two of its sides of the base are perpendicular to VP. It is cut by a plane inclined at 30° to HP and perpendicular to VP. The cutting plane bisects the axis of the pyramid. Obtain the development of the lateral surface of the truncated pyramid. (A)

COURSEOUTCOME4:Construct the intersection of curves of simple solids

1. A square prism 30 mm base sides and 70mm axis is completely penetrated by another square prism of 25 mm sides and 70 mm axis, horizontally. Both axes Intersects and bisect each other. All faces of prisms are equally inclined to VP. Draw projections showing curves of intersections.

2. A vertical cylinder of 80 mm diameter is completely penetrated by another cylinder of 60 mm diameter, their axes bisecting each other at right angles. Draw their projections showing curves of penetration, assuming the axis of the penetrating cylinder to be parallel to the VP.

COURSEOUTCOME5:Develop the isometric and perspective view of simple solids.

1. A cone of diameter 50 mm and axis 70 mm rests on its base on HP. A section plane perpendicular to VP and inclined at 30° to HP cuts the solid and

passes through a point on axis which is 40 mm above HP. Draw the isometric view of a truncated cone. (A)

2. A pentagonal pyramid of base edge 25 mm and height 65 mm rests vertically on its base on the HP such that one of its base edge parallel to VP. It is cut by a plane, parallel to HP and perpendicular to VP and passes through a point 25 mm from the apex. Draw the isometric view of the frustum of pyramid. (A)

Prepared by,

Verified by,

Dr. S. M. Rajkumar, Asp/Mech

Dr. M. Samual Hansen, HoD/Mech

		L	Т	Р	C				
24GE2901	DESIGN THINKING	1	0	0	1				
Preamble									
The course Design thinking help the learners to transform the way developing products, services,									
processes, and	l organizations. It brings innovative solutions to life based or	n how	real	user	s think,				
feel and behave.									
Prerequisites	s for the course								
Nil									
Objectives									
• Unders	tand the importance of design thinking concepts and principle	S							
• Use design thinking methods in every stage of the problem									
• Create prototypes for clear understanding of the problem statement.									
• Learn t	he different testing phases of design thinking								
• Apply v	various methods in design thinking to different industrial probl	ems							
UNIT I	INTRODUCTION			3					
Need for desig	n - Tools - Principles of Design Thinking - The process of Desi	gn Th	inki	ng - P	lanning				
a Design Thinl	king project.								
UNIT II	PROBLEM ANALYSIS AND DEFINITION			3					
Search field d	letermination - Problem clarification - Understanding of th	e pro	obler	n – I	roblem				
analysis - Ref	ormulation of the problem - Observation Phase - Empathetic	c desi	gn -	Meth	ods for				
Empathetic De	esign.								
UNIT III	IDEATION AND PROTOTYPING			3					
Ideate Phase -	The creative process and creative principles - Creativity tech	nniqu	es -]	Evalu	ation of				
ideas - Protot	ype Phase - Lean Start-up Method for Prototype Developme	ent -	Visu	alizat	ion and				
presentation t	echniques.								
UNIT IV	TESTING AND IMPLEMENTATION 3								

Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to							
conduct workshops - Requirements for the space - Material requirements - Agility for Design							
Thinking.							
UNIT V	DESI		3				
Design Think	ing meets the corp	oration – The New Social Contr	ract – Desig	gn Activism – Designing			
tomorrow – Case Study.							
		Tota	l Periods	15			
Suggestive A	ssessment Metho	ls					
Continuous	Assessment Test	Formative Assessment Test	End	Semester Exams			
(20	Marks)	(20 Marks)		(60 Marks)			
1. DESCRIPTI	VE QUESTIONS	1. ASSIGNMENT	1. DESCRI	PTIVE QUESTIONS			
		2. MCQ					
Outcomes							
Upon comple	etion of the course	, the students will be able to:					
CO1 – Unders	tand the key concep	ots of design thinking.					
CO2 – Apply c	lesign thinking in th	ie problem analysis phase.					
CO3–Apply d	esign thinking in th	e ideate and innovate phase of p	roblem sol	ving.			
CO4– Apply o	lesign thinking in th	netesting and implementation ph	iase.				
CO5 – Apply i	nnovative solutions	to real world problems using in	dustry stan	idards.			
Text Books							
1. NirEya	al. Edited by Ryan I	loover, Hooked- How To Build I	Habit-Form	ing Products, Published			
by Por	tfolio, 2014.						
2. Judkin	is Rod, The Art of Ci	eative Thinking, Hodder & Stou	ghton, 2015	5.			
Reference B	ooks						
1. Dan Se	enor, Saul Singer, St	art-up Nation, Hachette Book Gr	oup, 2009.				
2. Simon	Sinek, Start with W	/hy, Self-help book, 2009.					

Web Resources

- 1. https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them
- 2. https://www.youtube.com/watch?v=GNvLpfXCge8
- 3. https://www.coursera.org/lecture/patient-safety-project-planning/prototyping-phasejVuQ

CO Vs. PO Mapping and CO vs. PSO Mapping

С	PO	РО	PO	PO	РО	PSO	PSO	PS						
0	1	2	3	4	5	6	7	8	9	10	11	1	2	03
1	3		3								3	2		1
2		3	3	3								3		1
3	2	3	3	1	1							2		1
4	1		2	2	1	1	1	1	1		1	3		1
5	2		2				2	2	2		2	3		1

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER					
UNDERSTAND	70	70	70	70	
APPLY	30	30	30	30	
ANALYZE					
EVALUATE					
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

Course Outcome 1 (CO1):

1.Identify a real-world problem and describe how applying design thinking could lead to a better solution than traditional problem-solving methods.

2.Demonstrate how a specific design thinking tool (e.g., empathy mapping) can be applied to understand user needs in the context of a mobile banking app.

Course Outcome 2 (CO2):

1.Using the empathetic design method, conduct an observation phase to identify key pain points in the user experience of a public transportation system. How would you reformulate these pain points into actionable problem statements?

2.Clarify a problem faced by remote workers during virtual meetings by determining the search field and analyzing the problem. Propose an empathetic design method to develop a solution.

Course Outcome 3 (CO3):

1. In the ideate phase, utilize at least two creativity techniques to generate solutions for reducing food waste in restaurants. How would you evaluate these ideas to select the most viable one?

2. Apply the lean start-up method to develop a prototype for a new fitness app. How would you use visualization and presentation techniques to effectively communicate your prototype to potential investors?

Course Outcome 4 (CO4):

1. Design a desirability test for a new smart home device using the Kano Model. What steps would you take to gather user feedback, and how would you analyze the results to inform design improvements?

2. Plan a user testing workshop to evaluate a new educational app. What are the space and material requirements, and how would you ensure agility in adapting the workshop based on real-time feedback?

Course Outcome 5 (CO5):

1. How can a corporation integrate design thinking into its strategy to address a new social contract with its employees focused on remote work and well-being? Provide an example of a specific initiative and outline the steps taken.

2. Analyze a case study where design activism played a crucial role in driving social change. How were design thinking principles applied to achieve the desired outcomes?

Prepared by,	Verified by,
Mrs. A. Anitha,	Dr. S. Gomathy,
AP/CSBS	Asso. Prof/HOD CSBS

24HS2102 TECHNOLOCY IN TAMU CUI TUDE									
24032103	TECHNOLOGY IN TAMIL COLTORE	2	0	0	1				
Preamble:									
This course is offered to develop technical thinking based on Tamil tradition and to acquaint students with the fundamentals of various technologies through Tamil culture and history.									
Prerequisite: The prerequisite knowledge required to study this course is basic knowledge in English and Tamil Heritage.									
UNIT I WEAVING AND CERAMIC TECHNOLOGY									
Weaving Industry during Sangam Age–Ceramic technology–Black and Red Ware Potteries (BRW) – Graffition Potteries									
UNIT II	DESIGN AND CONSTRUCTION TECHNOLOGY				6				
Designing and Structural construction House & Designs in household materials during									
Sangam Age – E	Building materials and Hero Stones of Sangam Ag	ge– De	etails	of	Stage				
Constructions in S	ilapathikaram - Sculptures and Temples of Mamallap	ıram -	Great	Те	mples				
of Cholas and ot	of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai								
Meenakshi Temp	Meenakshi Temple)-ThirumalaiNayakar Mahal -Chetti Nadu Houses, Indo -Saracenic								
architecture at Ma	dras during British Period.								
UNIT III	MANUFACTURING TECHNOLOGY				6				
Art of Ship Build	ing - Metallurgical studies- art of Jewelry making -	Iron i	ndust	ry	- Iron				
smelting, steel -C	opper and gold- Coins as source of history - Minti	ng of	Coins	-	Beads				
making-industries	Stone beads -Glass beads -Terracotta beads -Shell	beads/	/ bon	e b	eats -				
Archeological evid	ences - Gemstone types described in Silapathikaram.								
UNIT IV	AGRICULTURE AND IRRIGATION TECHNOLOGY				6				
Dam, Tank, pon	ds, Sluice, Significance of KumizhiThoompu of C	hola P	eriod	, A	nimal				
Husbandry -Wells	designed for cattle use - Agriculture and Agro Proce	ssing -	Knov	vle	dge of				
Sea – Fisheries –Po	earl-Conceiving-Ancient Knowledge of Ocean-Knowled	ge Spe	cific S	oci	ety.				
UNIT V	SCIENTIFIC TAMIL & TAMIL COMPUTING			(6				

Development of Scientific Tamil - Tamil computing-Digitalization of Tamil Books-									
Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online									
Tamil Dictionaries –Sekai Project.									
Total Periods30									
Assessment Method									
Continuous Assessment 1 Continuous Assessment 2									
50 marks	50 marks								

Course Outcomes:

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

C01	To learn the techniques adopted in Industries of ancient Tamil culture.
CO2	To assess the technical competence of ancient Tamil.
CO3	To achieve the ability to think about various production technologies in Tamil Culture.
CO4	To explore the recovery and development of agricultural and water management technical skills of Tamil culture.
C05	To enumerate the technical development that Tamil has achieved in the field of science and computer.

CO PO Mapping:

C O	Р О 1	P 0 2	P 0 3	Р О 4	Р О 5	Р О 6	P 0 7	P 0 8	Р О 9	P 0 1 0	P 0 1 1
1								1	2	3	1
2								1	3	2	3
3								1	3	2	1
4								3	2	2	3
5								2	3	3	2

TEXT-CUM-REFERENCEBOOKS

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL–(in print)

2. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

5. Keeladi-'Sangam City Civilization on the bank of river Vaigai'(Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

6. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published By: TheAuthor)

7. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) Journey of Civilization IndustoVaigai (R.Balakrishnan) (Published by:RMRL)–Reference Book

Prepared by,

Verified by,

Dr.V Ponraj, AP/Tamil

Dr. Nagarajan, AP/Tamil

24HS2103 தமிழரும்தொழில்நுட்பமும்			Т	Р	C					
- 110-100		2	0	0	1					
முன்னுரை(II								
இந்தப்பாடத்திட்டம்பொறியியல்பயிலும்முதலாம்ஆண்டுமாணவர்களின்இரண்டாம்ப ருவத்திற்குரியது. தமிழ்மரபுசார்ந்ததொழில்நுட்பசிந்தனையைவளர்த்துபல்வேறுதொழில்நுட்பங்களின் அடிப்படைகூறுகளைத்தமிழரின்பண்பாடுமற்றும்வரலாற்றின்மூலம்மாணவர்களைஅ றியச்செய்தல்.										
பாடநெறிக்கானமுன்நிபந்தனைகள்(Prerequisites for the course)										
தமிழ்மொழியில்எழுதபடிக்கதெரிந்திருத்தல்அவசியம்.										
அலகு I	நெசவுமற்றும்பானைத்தொழில்நுட்பம்			6						
 சங்ககாலத்தில்நெசவுத்தொழில் - பானைத்தொழில்நட்பம் - கருப்புசிவப்புபாண்டங்கள் - பாண்டங்களில்கீறல்குறியீடுகள்										
அலகு II வடிவமைப்புமற்றும்கட்டிடத்தொழில்நுட்பம் 6										
சிலப்பதிகாரத்தில்மேடைஅமைப்புபற்றியவிவரங்கள் - மாமல்லபுரச்சிற்பங்களும், கோவில்களும் - சோழர்காலத்துபெருங்கோயில்கள்மற்றும்பிறவழிபாட்டுத்தலங்கள் - நாயக்கர்காலக்கோயில்கள் - மாதிரிகட்டமைப்புகள்பற்றிஅறிதல் , மதுரைமீனாட்சிஅம்மன்ஆலயம்மற்றும்திருமலைநாயக்கர்மஹால் - செட்டிநாட்டுவீடுகள் - பிரிட்டிஷ்காலத்தில்சென்னையில்இந்தோ -										
அலகு III	உற்பத்தித்தொழில்நுட்பம்			6						
அலகு IV	வேளாண்மைமற்றும்நீர்பாசனதொழில்நு	பம்		6						
அணை , ஏரி, குளங்கள், மதகு - சோழர்காலக்குமிழித்தூம்பின்முக்கியத்துவம் - கால்நடைபராமரிப்பு - கால்நடைகளுக்காகவடிவமைக்கப்பட்டகிணறுகள் - வேளாண்மைற்றும்வேளாண்மைச்சார்ந்தசெயல்பாடுகள் - கடல்சார்அறிவு - மீன்வளம் - முத்துமற்றும்முத்துகுளித்தல் - பெருங்கடல்குறித்தபண்டையஅறிவு - அறிவுசார்சமூகம்										

அறிவியல்தமிழின்வளர்ச்சி -	கணினித்தமிழ்வளர்ச்	- କେ
தமிழ்நூல்களைமின்பதிப்புசெய்தல் -	பாக்கம் -	
தமிழ்இணையகல்விக்கழகம் - தமிழ்மி	ன்நூலகம் - இணையத்தில்தமிழ்அ	கராதிகள் -
சொற்குவைத்திட்டம்.		
Total Periods		30
Assessment Method		
Continuous According to	Carting and Assessed	
Continuous Assessment 1	Continuous Assessme	ent Z
50 marks	50 marks	

எதிர்பார்க்கும்படிப்பின்முடிவுகள்

C01	மாணவர்கள்பண்டைத்தமிழரின்தொழில்நுட்பங்களைஅறிந்துகொள்வர்.
CO2	பண்டைத்தமிழரின்தொழில்நுட்பத்திறனைமதிப்பிடுதல்.
CO3	தாய்மொழியில்பல்வேறுஉற்பத்திதொழில்நுட்பங்களைக்குறித்துசிந்திக்கும்தி றனைஅடைவார்.
CO4	தமிழரின்வேளாண்மைமற்றும்நீர்மேலாண்மைதொழில்நுட்பதிறன்களைமீட்டு உருவாக்கம்செய்தல்குறித்துஅறிதல்.
CO5	அறிவியல்மற்றும்கணினிதுறையில்தமிழ்ப்பெற்றுள்ளதொழில்நுட்பவளர்ச்சி யைஅறிதல்.

Course Outcomes:

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

60	РО										
CU	1	2	3	4	5	6	7	8	9	10	11
1		1			1		1	1	2	1	
2		2	2		2	1	3	2	1	2	
3		2	3	1	2	1	1	1	2	1	
4			2				2	1	2	2	

5		2		1	2	1	3	

TEXT – CUM – REFERENCE BOOKS

- தமிழகவரலாறு- மக்களும்பண்பாடும் கே. கேபிள்ளை(வெளியீடு: தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
- 2. கணினித்தமிழ்- முனைவர்இல. சுந்தரம்(விகடன்பிரசுரம்).
- கீழடி- வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு).
- 4. பொருநை- ஆற்றங்கரைநாகரிகம் (தொல்லியல்துறைவெளியீடு)

Prepared by,

Verified by,

Dr.V Ponraj, AP/Tamil

Dr. Nagarajan, AP/Tamil

24CS2511	PYTHON PROGRAMMING LABORATORY	L	Т	Р	С
		0	0	4	2
Prerequisites for the course					
• 24CS	511 – Programming Practice Laboratory using C				
Objecti	ves				
1.	To build python programming skills for real-world applications.				
2.	To develop Python programs with conditionals and loops.				
3.	To use Python data structures - lists, tuples, dictionaries.				

4. 5	To do input/output with files in Python. To develop collaboration skills by working in teams on projects	
S.No	List of Experiments	СО
1	Pasic Duthon Drogramming	<u> </u>
L	a) Write a program that takes 2 numbers as commond line	COI
	a) write a program that takes 2 numbers as command line	
	arguments and prints its sum.	
	b) Implement python script to show the usage of various	
	operators available in python language.	
2	Python Programs using conditionals – if, if – else, if – elif – else	
	statements	
	a) Write a program for checking the given number is even or	
	odd.	
	b) Write a program for finding biggest number among 3	
	numbers	CO2
	c) Implement python script to read person's age from keyboard	
	and display whether he is eligible for voting or not.	
	d) Implement python script to check the given year is leap year	
	or not	
3	Python Programs using looping statements	
	a) Implement Python Script to generate first N natural numbers.	
	b) Implement Python Script to check given number is	
	palindrome or not.	CO2
	c) Implement Python script to print factorial of a number.	
	d)Implement Python Script to check given number is Armstrong	
	or not.	
4	Python Programs using Functions	
	a) Define a function max_of_three() that takes three numbers as	CO2

	arguments and returns the largest of them.	
	b) Write a program which makes use of function to display all	
	such numbers which are divisible by 7 but are not a multiple of	
	5, between 1000 and 2000.	
5	Python Programs using List	
	a) Write a program which accepts a sequence of comma - separated numbers from console and generate a list and a tuple	
	which contains every number. Suppose the following input is	CO3
	supplied to the program: 34, 67, 55, 33, 12, 98. Then, the output	
	should be: ['34', '67', '55', '33', '12', '98'] ('34',67', '55', '33', '12',	
	'98').	
6	Python Programs using String, Tuples, Numpy array.	
	a) Accepts a string and calculate the number of upper case	
	letters and lower case letters.	
	b) Write a python program to check whether the given string is	603
	palindrome or not.	03
	c) Create all possible strings by using 'a', 'e', 'i', 'o', 'u'. Use the	
	characters exactly once.	
	d) Multiply all the numbers in a list.	
7	Python Programs using Dictionary a) Create a dictionary and apply the following methods 1) Print the dictionary items 2) access items 3) use get() 4)change values 5) use len()	CO3
8	Python Programs using Files	
	a) Write Python script to display file contents.	<u> </u>
	b) Write Python script to copy file contents from one file to	04
	another.	
9	Programs to implement Inheritance.	CO4
10	Python Programs using Exceptions	CO3
11	Calculation of the Area : Don't measure	CO3
12	Monte Hall : 3 doors and a twist	CO3
13	Sorting : Arrange the books	CO3

14	Searching : Find in seconds	CO3		
15	Anagram	CO2		
16	Lottery Simulation - Profit or Loss	CO3		
17	Simulate a password generator	CO3		
18	Simulate a grade book for a teacher	CO2		
19	Rock Paper and Scissor.	CO2		
20	Converting an Image to Black and White/Grayscale	C05		
21	Blurring an Image, Edge Detection and Reducing the Image Size	C05		
C No	List of Dupingto	Deleted	CO	
3.NO.	List of Projects	Experiment	LU	
16.	Currency Conversion system	EXP 1,2,7,11	CO 1- CO 5	
17.	ATM System	EXP1,2,8,9,11	CO 1- CO 5	
18.	Airline Reservation System	EXP 1,2,3,6,7,8,9,11	CO 1- CO 5	
19.	Library Management System	EXP 1,2,3,4,5,6,7,8,9,11	CO 1- CO 5	
20.	Restaurant Billing System	EXP 1,2,3,4,6,7,8,9,11	CO 1- CO 5	
21.	Inventory System	EXP 1,2,3,4,5,6,7,8,9,11	CO 1- CO 5	
22.	College management system	EXP	CO	
		1,2,3,4,6,7,8,9,11 1- CO 5		
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23.	Number Guessing Game	EXP 1- 1,2,3,6,7,8,9,10,11 CO 5		
24.	Electricity billing system	EXP 1,2,3,6,7,8,9,11 CO 5		
25.	Healthcare management System	EXP 1- 1,2,3,4,5,6,7,8,9,11 C0 5		
26.	Blood Donation System	EXP 1,2,3,6,7,8,9,11 5		
27.	Quiz Application	EXP 1- 1,2,3,4,6,7,8,9,11 CO 5		
28.	Stock management system	EXP 1- 1,2,3,4,5,6,7,8,9,11 CO 5		
29.	Payroll Management System	EXP 1,2,3,6,7,8,9,11 CO 5		
30.	Exam Seating Arrangement System	EXP 1,2,3,6,7,8,9,11 CO 5		
Suggest	ive Assessment Methods			
Lab Com	iponents Assessments	End Semester Exams		

(60 M	arks)	(40 Marks)
4. 5. 6.	Exercises (Hacker rank score) Project File (Progress Score) Viva voce	4. Record note5. Exercises6. Viva voce
Outco	mes	
Upon	completion of the course, the students will be abl	e to:
CO1	Write simple Python programs for solving problem	ns using conditional statements.
CO2	Write Python programs for solving problems using	looping statement and list and
	decompose a Python program into functions.	
203	Represent data using Python strings, array computational	rs, tuples, dictionaries and solve
	problems using them and use Numpy and Pandas l	ibraries in real time applications.
CO4	Read and write data from/to files in Python progra dealing	ms and handle exceptions while
	with data.	
CO5	Apply the power of graphics for processing images	
Labora	atory Requirements	
SOFT	WARE AND HARDWARE REQUIREMENTS FOR A BA	АТСН:
HARD	WARE:	
Intel D	esktop Systems: 36 nos	
Printe	rs: 02	
SOFTV	WARE:	
Micros	soft Windows 10	
Net Be	ans 8.0.2, JDK 7.0.	
Refere	ence Books	
1. Univer	ReemaThareja, "Python Programming: Using Probl rsity Press, 2017.	em Solving Approach", Oxford
2. Secono	Allen B. Downey, "Think Python: How to T dEdition,Shroff/O'Reilly Publishers, 2016	ſhink Like a Computer Scientist",
3.	José M. Garrido, "Introduction to Computational Mod	els with Python", CRC Press, 2015.

Web Re	esources
1.	https://searchapparchitecture.techtarget.com/definition/python-programming
https://	/en.wikipedia.org/wiki/python_programming
2.	https://www.geeksforgeeks.org/ python -programming /
3.	https://www.webopedia.com/TERM/O/python _programming

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01	PSO2	PSO3
1	3	2	2					2	1	1		3	3	2
2	3	2	2					2	1	1		3	3	2
3	3	2	2					2	1	1		3	3	2
4	3	2	2					2	1	1		3	3	2
5	3	2	2					2	1	1		3	3	2

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Write a Python Program to read the unit of electricity consumed in a house and calculate the amount to be paid for the electricity consumed. The bill amount should be calculated as per the given specification:

a. For 0 to 100 units the per unit is ₹ 0/-

b. For 0 to 200 units, for the first 100 unit the per unit cost is zero and the next 100 units, the consumer shall pay \ge 1.5 per unit.

c. For 0 to 500 units, the consumer shall pay \gtrless 0 for the first 100 units, for the next 100 units the consumer shall pay \gtrless 2 per unit, for the next 300 units the unit cost is $\end{Bmatrix}$ 3.00/-(Apply)

2. Chef and Chefina are at positions X and Y on a number line. They both love badminton. It is known that badminton courts are located at every integer point. They want to find a court such that the maximum distance travelled by either of them is minimized. Formally, suppose they choose the badminton court at position Z. You need to find the minimum value of max (|X-Z|, |Y-Z|)max(|X-Z|,|Y-Z|) across all possible choices of Z. Here, |X| denotes absolute value of X. Write a Python Program to Report this minimum value.

Input Format

The first line of input will contain a single integer T, denoting the number of test cases.

Each test case consists of two space-separated integers Xand Y.

Output Format

For each test case, output the minimum possible value of $\max(|X-Z|, |Y-Z|)\max(|X-Z|, |Y-Z|)$.

Constraints

1≤T≤1000

1≤X,Y≤1000

X<=Y

Sample :

Input

4

35

76

1 10

Output

- 1
- 1
- Ť
- 5

16

3.Develop a Python Program to Check if a Date is Valid and Print the Incremented Date if it is. (Apply)

COURSE OUTCOME 2:

4. Write a Python Program to Read a Number n and Compute n+nn+nnn. (Apply)

5. Write a program to find Sum of Digit of a Number using Recursion in Python. (Apply)

6. Differentiate break and continue. (Understand)

COURSE OUTCOME 3:

Develop Python programs using OOP principles (Understand, Apply)

5. Describe the various features of the Object-Oriented Programming Language. (Understand)

6. Develop a Python program to generate student class to calculate the student performance based on the following criteria: Above 75 percentage as Distinction, 60 to 74 percentage as First Class and Below 60 percentage as Second class. (Apply)

7. Write a Python program to sort set of names stored in an array in alphabetical order. (Apply)

COURSE OUTCOME 4:

What happens if the file is not found in the following Python code? (Apply)

a=False

while not a:

try:

f_n = input("Enter file name")

i_f = open(f_n, 'r')

except:

```
print("Input file not found")
```

Write a Python Program that Reads a Text File and Counts the Number of Times a Certain Letter Appears in the Text File. (Apply)

Write a Python Program to Extract Numbers from Text File. (Apply)

Write a Python Program to merge two files into a third file. (Apply)

COURSE OUTCOME 5:

1.Write a python program to convert RGB image to Black and white Image. (Apply)

2. How will you program GUI with TkinterLibrary?Explain. (Understand)

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	ΤΟΡΙϹ	NO OF WEEKS REQUIRED
1.	Program to implement Variables , Data Types	1 st week
2.	Programs to implement Control Structures	1 st week
3.	Programs to implement Functions and Modules	2 nd week
4.	Programs to implement Strings	2 nd week

5.	Programs to implement List Manipulation	3 rd week
6.	Program using Tuples, Sets, and Dictionaries	3 rd week
7.	Program to implement String Operations	4 th week
8.	Implementing simple OOP concepts in Python	4 th week
9.	Program using File Handling	5 th week
10.	Program using Exception Handling	5 th week
11.	Program to implement Libraries and Frameworks	6 th week
12.	Program using Packages	6 th week

Prepared by,

Mr.M.Mukesh Krishnan, Swaminathan,

AP /CSE

Verified by,

Dr.G.Aravind

Prof/ CSE

21AI2611	Artificial IntelligenceToolsLaboratory	L	Т	Р	С

		0	0	4	2
Preamble The goal of t Its purpose at	he AItools lab is to provide familiarity with AI tools for profe nd perhaps some key feature so benefits it offers.	essional app	olicati	ons,	<u> </u>
Prerequisites	for the course				
• NIL					
Objectives					
 visualiza 2. Engage designin 3. To analy 4. To deplo 5. To Appl 	ations. in practical exercises and projects that involved at a visualization and da ig, implementing, and deploying AI models. /ze and interpret images and videos, such as facial recognition or object by AI models training, evaluation and optimization. . y AI techniques to solve real world problems	ashboarding t	ools ii	ivolv	es
S.No	mble goal of the Altools lab is to provide familiarity with AI tools for professional applications, urpose and perhaps some key feature so benefits it offers. quisites for the course NIL tives Understanding thecomplex Alconceptstonon-technicalstakeholdersthroughpresentations, reports, and visualizations. Engage in practical exercisesandprojectsthatinvolvedatavisualizationanddashboarding tools involves designing, implementing, and deploying AI models. To analyze and interpret imagesandvideos, suchasfacialrecognitionorobjectdetection. To deploy AI modelstraining, evaluationandoptimization. To Apply AI techniques tosolverealworldproblems No List of Experiments with plagiarism checking using slideAI,neo-gpt CO 1 Converting idea to customized presentation, technicalpaper with plagiarism checking using slideAI,neo-gpt CO1 3 Creating Dashboards using Google datastudio CO2 4 Creatinginteractivedashboardforbusinessapplication using PowerBI CO2				
1	Converting idea to customized presentation,technicalpaper with plagiarism checking using slideAI,neo-gpt	CO1			
2	Bug fixing and troubleshooting withCodeium	0 0 4 2 s lab is to provide familiarity with AI tools for professional applications, as some key feature so benefits it offers. ourse complex AIconceptstonon-technicalstakeholdersthroughpresentations, reports, and a lexercisesandprojectsthatinvolvedatavisualizationanddashboarding tools involves enting, and deploying AI models. erpret imagesandvideos, suchasfacialrecognitionorobjectdetection. setstraining, evaluationandoptimization. siques tosolverealworldproblems CO List of Experiments CO ng idea to customized presentation,technicalpaper giarism checking using slideAI,neo-gpt CO1 ng and troubleshooting withCodeium CO2 Dashboards using Google datastudio CO2 interactivedashboardforbusinessapplication using CO2			
3	Creating Dashboards using Google datastudio				
4	Creatinginteractivedashboardforbusinessapplication using PowerBI	CO2			

5			
	Creating interactive multilingual chatbot for customer service using Google dialog flow	CO2	
6	Object Detection using Google'sTeachablemachine	CO3	
7	Motion Detection using Google's teachable machine	CO3	
8	MLapplicationdevelopmentandcodegenerationusing vertex AI – classification/ prediction/associations	CO4	
9	BuildingAIPersonalTrainerwithIBMWatsonand deployment in webapp	CO4	
10	Webapplicationdevelopmentfordiseasepredictionusingstrea mlit	CO5	
11	Personalizedrecommendationsystemusingstreamlit	CO5	
		PO	
S.No.	List of Projects	PO	СО
1.			
	PlagiarismGrammarcheckingforcontentwriting.	PO1,PO5	CO1
2.	CodeReviewAssistance	PO1,PO5 PO1,PO5	CO1 CO2
2.	CodeReviewAssistance CustomerDashboard Creation	PO1,PO5 PO1,PO5 PO1,PO5	CO1 CO2 CO2
2. 3. 4.	PlagiarismGrammarcheckingforcontentwriting. CodeReviewAssistance CustomerDashboard Creation UserqueriesChatbotCreation	PO1,PO5 PO1,PO5 PO1,PO5 PO1,PO5	CO1 CO2 CO2 CO2 CO2
2. 3. 4. 5.	PlagiarismGrammarcheckingforcontentwriting. CodeReviewAssistance CustomerDashboard Creation UserqueriesChatbotCreation Stock prediction	PO1,PO5 PO1,PO5 PO1,PO5 PO1,PO5 PO1,PO5	CO1 CO2 CO2 CO2 CO2 CO3
2. 3. 4. 5. 6.	PlagiarismGrammarcheckingforcontentwriting. CodeReviewAssistance CustomerDashboard Creation UserqueriesChatbotCreation Stock prediction Consumersentimentanalysis	PO1,PO5 PO1,PO5 PO1,PO5 PO1,PO5 PO1,PO5 PO1,PO5	CO1 CO2 CO2 CO2 CO3 CO3

8.	Spamemailclassifier		PO1,PO5	CO4
9.	Fakenewsdetector	sdetector PO1,		CO5
10.	Couponpurchase prediction	PO1,PO5	CO5	
Suggestive	eAssessmentMethods			
LabCom	ponentsAssess	EndSemesterE	Exams (50	
ments (50 Marks)		Marks)		
ProjeViva	ectFile(ProgressScore) woce	1.Recordnot2.Exercises3.Vivavoce	e	
ourseOut	comes			
J pon com j	pletion ofthecourse,thestudentswilll	peableto:		
CO1	Improve the ability to communica stakeholdersthroughpresentations generations.	ate complex AI con ,reports,visualizatio	cepts to non-technica	l de
CO2	Developcriticalthinkingskillstoev content and debugging solutions	aluatevisualizationi effectively.	ndataand dashboardir	ng tools for
CO3	UseAItoanalyzeandinterpretimage detection.	esandvideos, suchas	facialrecognitionor ol	bject
CO4	Engageinpracticalexercisesandpro deploying AI models. This includ and optimization	ojectsthatinvolvedes les data preprocessi	signing, implementing ng, model training, ev	and valuation,
CO5	ApplyAItechniquestosolvereal-wo healthcare, finance, marketing, ar thinking,andinnovation.	orldproblemsacross nd more. Emphasis o	variousdomainssucha on problem-solving, c	eritical
Laborat	toryRequirements			

- ComplierSystemwith windows
- Internet

ReferenceBooks

1."Artificial Intelligence:AModernApproach"byStuartRussellandPeterNorvig

WebResources

- 1. <u>https://www.ibm.com/products/app-connect/integrate-data?utm_content</u>
- 2. https://findmyaitool.com/category/resources
- 3. https://openai.com/

Prepared by,

Verified by,

Ms. R. KAVITHA, AP/AIDS Dr.A.Anitha, HoD/AI&DS

SEMESTER III

5.N	Course Code	Course Name	Catego ry	Conta ct Period s	L	T	P	C
		Theory C	ourses					
1	24MA320	Mathematics for Data Science	BS	3	3	1	0	4
2	24IT3501	Digital Principles and System Design	ES	3	3	0	0	3
3	24AI3601	Data Structures and Algorithm Analysis	PC	3	3	0	0	3
4	24AI3602	Data Science Using python	PC	3	3	1	0	4
5		Open Elective-I	OE	3	3	0	0	3
			Practical	Courses				-
1	24AI3611	Data Structures and Algorithm Analysis Lab	PC	4	0	0	4	2
2	24AI3612	Data Science lab	PC	4	0	0	4	2
3	24PT3902	Soft Skills-Verbal Ability	EEC	2	0	0	2	1
			Total	25	5	2	.0	22

ANALYSIS ANALYSIS (CommontoAI-DSandCi Preamble Data structures course focusing on effective programming the orogramming language. Algorithms will be discussed greedy algorithms NP completeness. Prerequisitesforthecourse 24CS1501-Introduction to programming withC Objectives TounderstandtheconceptsofADTslineardatast: Toapplynon-linear data structure operations Tounderstandhashingalgorithms and sorting a To learn information about algorithms, asymptot algorithms. To Develop dynamic programming algorithms fullustrate and apply backtracking algorithms, fulgorithms. UNITI LINEAR AND NON LINEARDATASTRUCT Abstract Data Types (ADT) - List ADT-linked list implementation upplications of lists –Stack ADT Operations – Applications: E Conversion ofInfixtopostfix expression –Queue ADT –circund queues SUGGESTEDACTIVITIES: Practicedesigningalgorithmsforsomesmallsimplegatedtheircomplexity Convertinganalgorithmfromrecursivetonon-recursive SUGGESTEDEVALUATIONMETHODS: Assignment-Basedondesign, correctnessandefficience Quizzes 	GORITHM		T	Р	C
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 SUGGESTEDEVALUATIONMETHODS: Assignment-Basedondesign,correctnessandefficience Quizzes 	eusingstack				
Assignment-Basedondesign,correctnessandefficienceQuizzes					
• Quizzes	V				
	, ,				
24A13601 DATASTRUCTURES AND ALGORITHM ANALYSIS (CommontoAI-DSandCSBS) 2 1					

KruskalandPrimalgorithm–Shortestpathalgorithm–Dijkstra'sAlgorithm

SUGGESTE	DACTIVITIES:	
Applic	ationsoftrees.	
Practic	calImplementinggraph traversals.	
SUGGESTEI	DEVALUATIONMETHODS:	
 Assign Ouizze 		
UNITIII	HASHING AND SORTING	9
Hashing – Sepa Selection Sort,	rate chaining - open addressing – rehashing - extendible hashing - Sorting - Insertion Sort- Quick sort, Merge sort- Hashing - Hash Functions	Bubble sort -
SUGGESTE • Practic	DACTIVITIES: cal–ImplementationofHashtable	
SUGGESTEI	DEVALUATIONMETHODS:	
• Assign	amentrelatedtoapplication	
• Progra	mmingexercisesinthelaboratory	
• Quizze	es	
UNITIV	INTRODUCTION TO ALGORITHM	9
Introduction to al PerformanceAna Omega notation	gorithm analysis: Algorithm Specification -Analysis Framework - lysis: Space complexity, Time complexity - Asymptotic Notations: En (Ω) , Theta notation.	Big-Oh notation (O),
SUGGESTE	DACTIVITIES:	
• Compa	arison of Asymptotic Notation	
SUGGESTEI	DEVALUATIONMETHODS:	
• Assign	nmentProblem	
• Progra	mmingexercisesinthelaboratory	
• Quizzo	es	
UNITV	ALGORITHM DESIGN AND ANALYSIS	9

Introduction to algorithm design techniques: Greedy algorithms, Divide and conquer: General method, Binary search, Recurrence equation for divide and conquer, Dynamic programming: Knapsack problem, Bellman-Ford Algorithm, backtracking: N-Queens problem, branch and bound, Randomized algorithms

SUGGESTEDACTIVITIES:

• Comparisonofalgorithms Analysis

SUGGESTEDEVALUATIONMETHODS:

- Programmingexercisesinthelaboratory
- Quizzes

TotalPeriods

45

Outcomes

1. Understandtheconceptofabstractdatatypes, algorithms, BigOnotationbasic data structuressuchasarrays, linked lists, stacks and queues. (Understand)

2. Apply Algorithm for solving non-linear data structure operations, Graph, Tree (Apply)

- **3.** Tounderstandhashingalgorithms and sorting applications. (Apply)
- 4. TO Understand information about algorithms, asymptotic notations, and performance analysis(Apply)

5. Evaluate thesuitability of different data structures for solving computing problems and Develop dynamic programming algorithms for various real-time

applications.(Analyze)

TextBooks

1. Sanjay Agal" Advanced Data Structures and Algorithms "

Publisher: Xoffencer edition 2023

2. Thomas H. Cormen Charles E. Leiserson Ronald L. Rivest Clifford Stein "Introduction to Algorithm", 4 th edition 2022

ReferenceBooks

- 1. LucianooMandhi Introduction Algorithm in C A Step by Step guide to algorithm in C Published Jan 2020
- 2. Seymur Lipschitz Datastructure with C Tata MC Graw-hill published 2011

WebResources

- 1. <u>https://www.coursera.org/specializations/data-structures-algorithms-tsinghua</u>
- 2. <u>https://www.coursera.org/specializations/boulder-data-structures-algorithms</u>

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COVs POM apping and COVs PSOM apping

C	PO	PO1	PO1	PSO	PSO	PS								
0	1	2	3	4	5	6	7	8	9	0	1	1	2	0
														3
1	3	3	3											
2	3	3	3									3		
3	3	3	3		3					3	3	3	3	3
4	2	3	3	3	3					3	3	3	3	3
5	2	3	3	3	3					3	3	3	3	3

COURSELEVELASSESSMENTQ

UESTIONSCOURSEOUTCOME

1:

- 1. Givenanarrayandasinglylinkedlist.Whichofthesedatastructuresusesmorememorys pace tostorethesamenumberofelements?Justifyyouranswer.(Understanding)
- Writethepostfixformofeachofthefollo winginfix.(Apply)A-B+(M/N)*(-O+P)-Q/R^S*T+Z K+L-M*N+(O^P)*W/U/V*T+Q
- 2. Designastackthatreturnsminimumelementinconstanttime(Analyze)
- Givena5elementstackS(fromtoptobottom:2,4,6,8,10),andanemptyq ueueQ,removetheelementsone-byonefromSandinsertthemintoQ,thenremovethemonebyonefromQandre-insert themintoS. List theelementsinS(fromtoptobottom).(Analyze)

COURSEOUTCOME2:

1. Givenabinarytree, findallancestors of a given node init. (Understand)



- 2. Explainthefollowing
 a) CompleteBinaryTree
 b) BinaryTree
 C)BinarySearchTree.(Understand)
- 3. Writeanalgorithmtoprintcompletebinarysearchtreeinincreasingorder.(Apply)
- Suppose inorder and preorder traversal of a binary tree: (Analyse)InorderD,B,H,E,A,I,F,J,C,G PreorderA,B,D,E,H,C,F,I,J,G

COURSEOUTCOME3:

1.Describe how **path compression** and **union by rank** would improve the performance of the **Disjoint Set ADT** when determining if two devices are connected, especially as the network grows large.

2.How would you choose a suitable **hashing strategy** (separate chaining vs. open addressing) for storing device information, and how does **rehashing** help maintain system performance as the number of devices increases?

COURSEOUTCOME4:

1. What is the key difference between analyzing recursive and non-recursive algorithms?

2. Give an example of a non-recursive algorithm for finding the maximum element in an array.

COURSEOUTCOME5:

1.Explain the working of Prims algorithm using Greedy technique. (Apply)

2.Solve the following instance of 0/1 Knapsack problem using Dynamic programming n = 3; (W1, W2, W3) = (3, 5, 7); (P1, P2, P3) = (3, 7, 12); M = 4. (Apply)

Prepared by

Verified by

MRS.R.GOMATHISELVI,AP/AI&DS DR.A.ANITHA,HOD/AI&DS

24AI360	DATA COUNCE LICING DUTION	L	T	P	С
2	DATA SCIENCE USING PYTHON	3	0	0	3
Preamble					
This course en statistics, and o data for fore decision-makin	compasses the analysis and evaluation of data using computer science. The main goal of this course is to casting, trend analysis, product development, ag.	mathe gather and st	mati use trate	cs, ful gic	
Prerequisites	for the course				
• 24MA32	01 Mathematics for Data Science				
• 24CS250	1 - Introduction to Computing using Python				
Objectives					
1. To und	erstand the techniques and processes of data science	e.			
2. To lear	n the tools and packages in Python for data science.				
3. To und	erstand the mathematical skills in statistics.				
4. To und	erstand the basic concepts of machine learning.				
5. To sum	marize, analyze and visualize the data.				
UNIT I	FUNDAMENTALS OF DATA SCIEN	NCE			9
Need for data	science – benefits and uses – facets of data – Life	cycle	of D	ata	
Science Proje	ct - setting the research goal - retrieving data	– cle	ansi	ng,	
integrating, an	d transforming data – exploratory data analysis	s – bu	ild	the	
models – prese	nting and building applications.				
SUGGESTEI	ACTIVITIES:				
• Create	a chart or infographic that illustrates various applic	ations	of d	ata	
science	across industries.				

SUGGESTED EVALUATION METHODS: Assignment problems Quizzes **UNIT II** 9 **PYTHON FOR DATA HANDLING** 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 – handling missing data – hierarchical indexing – combining datasets – aggregation and grouping – pivot tables. **SUGGESTED ACTIVITIES:** • Create a Numpy array with random integers and practice various aggregation functions (e.g., sum, mean, max, min). **SUGGESTED EVALUATION METHODS:** Assignment Problem • Quizzes ٠ UNIT III **DATA EXPLORATION AND ANALYSIS** 9 Frequency distributions - Outliers - interpreting distributions - graphs - averages describing variability - interquartile range - variability for qualitative and ranked data - Normal distributions - zscores -correlation - scatter plots - regression - regression line - least squares regression line standard error of estimate- multiple regression equations - regression toward the mean. SUGGESTED ACTIVITIES: • To compute both relative and cumulative frequency distributions. **SUGGESTED EVALUATION METHODS:** Assignment Problem

• Quizzes

UNIT IV	MACHINE LEARNING BA	SICS	9								
Introductionand moti	vation for Machine Learning (ML) - Essentia	l concepts of ML -								
Types of Machine le	arning methods – Examples of	ML applicatio	ns - Early trends in								
Machine learning – I	Data understanding, representati	on and visualiz	ation – Hypothesis–								
Modelling in Machin	e learning - Predictive Modelin	ng – Definition	and significance of								
predictive modeling -	- Use cases of predictive modelin	ng.									
SUGGESTED ACT	IVITIES:										
• Create a mind map illustrating the types and examples of machine learning.											
SUGGESTED EVAI	LUATION METHODS:										
• Presentation a	nd reports.										
• Ovizzas											
• Quizzes.											
UNIT V V	ISUALIZATION WITH MAT	TPLOTLIB	9								
General MatplotLib	- Simple Line Plots - Simple S	Scatter Plots - I	Density and Contour								
Plots- Histograms, I	Binnings, and Density, Custor	nizing Plot Le	gends, Customizing								
Colorbars, Text and	Annotation, Three-Dimensional	Plotting in Ma	tplotlib, Geographic								
Data with Basemap, V	visualization with Seaborn										
SUGGESTED ACT	IVITIES:										
• Perform the da	ata visualization for behaviour o	f human in onlir	e social networks								
SUGGESTED EVAI	LUATION METHODS:										
• Assignment P	roblem										
• Quizzes											
		Total Periods	45								
Suggestive Assessme	ent Methods		1								
Continuous Assessment TestContinuous Assessment TestEnd Semester Exams(30 Marks)(10 Marks)(60 Marks)											

1. DESCRIPTIVE QUESTIONS	1.ASSIGNMENT2. ONLINE QUIZZES3.PROBLEM-SOLVING ACTIVITIES	1. DESCRIPTIVE QUESTIONS
Course (Outcomes	
Upon co	mpletion of the course, the st	tudents will be able to:
1. Understar	nd the skills of data inspecting an	d cleansing.
2. Acquire k	knowledge of primary tools usage	e for data science in Python.
3. Determin	e the relationship between data d	ependencies using statics.
4. Explain the	he basic concepts of machine lear	rning.
5. Apply the	e knowledge for describing and v	isualization using tools.
	Text Books	
1. Wes Mck edition, 202	Kinney," Python for data analy 22	rsis ",O'Reilly Media. Third
2.Introduct more, usin Mohamed A	ing Data Science : Big data, ng Python tools, <u>Arno D. B.</u> Ali, 2016, 1st edition , Manning	machine learning, and <u>Meysman Davy Cielen&</u> Publications.
3.Ethem A Press, Four	lpaydin, " Introduction to M th Edition, 2020.	lachine Learning", MIT
Referen	ce Books	
 Learning <u>Nolan</u>Relet The Pract April 2020 Python D December 	Data Science by <u>Sam</u> eased September 2023, Publishe tice of Statistics ,W.H.Freeman 0) ata Science Handbook, 2nd E 2022,Publisher(s): O'Reilly Me	Lau, Joseph Gonzalez, Deborah er(s), O'Reilly Media, Inc. n& Co Ltd; 6th ed. 2020 edition (8 Editionby Jake VanderPlasReleased edia, Inc.
Web Resources		
1. <u>https:</u>	//onlinecourses.nptel.ac.in/noc22	_cs74/preview_

2. https://towardsdatascience.com/

Mapping and CO Vs PSO Mapping

C	PO	PO1	PO1	PSO	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	1	1	2	1					3	1	3	3	3	1
2	1	1	2	2	2				2	2	3	3	1	1

3	1	1			2		2		2			3	
4	2	1	1	1	2			3	3	1		2	1
5	2	1	2	2	3						3	3	3

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

• Explain the steps involved in a typical data science workflow. How do each of these steps contribute to the overall analysis?(UNDERSTAND)

• Given a dataset and a project objective, identify the appropriate data science techniques (e.g., data cleaning, exploratory data analysis, model selection) that would be used in each step of the analysis.(APPLY)

COURSE OUTCOME 2:

• Write a Python function that loads a dataset using Pandas, cleans any missing values, and returns basic descriptive statistics. (APPLY)

• Compare and contrast the data handling capabilities of Pandas with those of Numpy. Why might a data scientist choose one library over the other for specific tasks?(Analyze)

COURSE OUTCOME 3:

• Define key statistical concepts (e.g., mean, median, mode, standard deviation) and explain their significance in data analysis.(Understand)

• Analyze the implications of outliers on mean and standard deviation. How would you handle outliers in a dataset, and why?(**Analyze**)

COURSE OUTCOME 4:

• Design a basic ML workflow for predicting house prices, detailing the role of data collection, preprocessing, model training, and evaluation.(**Apply**)

• Analyze the importance of splitting data into training, validation, and test sets in the context of building robust ML models.(**Analyze**)

COURSE OUTCOME 5:

• Using Matplotlib and Seaborn, create visualizations (e.g., histogram, scatter plot) that represent the distribution and relationship between features in a dataset. Explain any patterns or trends observed.(**Apply**)

• Given a set of visualizations, analyze the data trends and relationships. Identify potential areas for further investigation, and discuss what these trends might indicate about the underlying data.(Analyze)

Prepared by

Verified by

MS.B.VARSHATNIKILA, AP/AI&DS

DR.A.ANITHA,HOD/AI&DS

24AI3611	DATASTRUCTURES AND ALGORITHM	L	Т	P	C
	ANALY SIS LAB	0	0	4	2
Preamble					
The laborate	prycourse will enable the students to Learn data structures for	vario	us ap	plicat	ions.
Implement of	lifferent operations of data structures by optimizing the	perfor	manc	e,Dev	elop
applications	using Greedy, Divide and Conquer, dynamic programming. In	nplem	ent ar	oplica	tions
for backtrack	ing algorithms using relevant data structures.	1	1	1	
Prerequisit	esforthecourse				
• 24	CS1501-ProblemSolvingandLogicalThinkingusingC				

Objectives

- Learn data structures for various applications.
- Implement different operations of data structures by optimizing the performance
- Develop applications using Greedy, Divide and Conquer, dynamic programming.
- Implement applications for backtracking algorithms using relevant data structures.

S ·	ListofExperim ents	C O
N		
0		0
1	Write a program to implement the following operations on	C
	Binary Search Tree: a) Insert b) Delete c) Search d) Display	0
		I
2	Write a program to perform a Binary Search for a given set	С
	of integer values.	0
		2
3	Write a program to implement AVL trees.	C
4	Write a nucleum to invalorment Manage aget for the given list of	
4	while a program to implement Merge sort for the given list of	C
	integer values.	0
		2
5	Write a program to implement Quicksort for the given list of	С
	integer values.	0
		2
6	Write a program to find a single source shortest path for a	С
	given graph	0
		3
7	Write a program to find minimum cost spanning tree using	С
	Prim's algorithm	0
		4
8	Write a program to find minimum cost spanning tree using	
-	Kruskal's algorithm	С
		0
		4

9	Write a program to find the solution for the knapsack problem using the greedy method.		C O 5						
1 0	Write a program to find the solution for job sequencing with deadlines problems.		C O 5						
1 1	Write a program to find the solution for a 0-1 knapsack problem using dynamic programming.	x	C O 5						
1 2	1Write a program to solve Sum of subsets problem for a2given set of distinct numbers using backtracking.								
S N 0	ListofProj ects	Relate dExperi ment	СО						
1	Build a simple calculator	1 , 2 , 3	CO1						
2	Cash Flow Minimizer	1 , 2 , 5	CO1						
3	Map Navigator	1 , 2 , 4	CO1						
4	Building Cross Word puzzle Game	1 , 2 , 4	CO2						
5	Plagiarism detection system	1 , 2 , 4	CO2						
6	E Commerce Inventory Management system	1,2,6, 7	CO3						

7	Data Compression using Huff	man Encoding	126	CO3
,			7	000
0	Banking management system		1	CO3
0	Danking management system		1	005
			2	
			, 0	
9	Travel planner using Graph		<u> </u>	CO4
-			,	
			2	
			, 9	
1	Real-time traffic analysis		1	CO4
0			,	
			2	
			, 1	
			0	
	LabComponentsAssessments	EndSemesterH	Exam]
	(60Marks)	(40 Marks	5)	
	1 LABEXPERIMENTS(20)	I PRACTICAL EXAN	Л	-
	2. VIVA			
	3. MODELEXAMINATION			
	4. TEST PREOJECT			

Outcomes:

- 1. Students can able to understand the concept of abstract data types, algorithms, Big O notation basic data structures such as arrays, linked lists, stacks and queues.(Understand)
- 2. Apply Algorithm for solving non-linear data structure operations (Apply)
- 3. Tounderstandhashingalgorithms and set applications. (Apply)
- 4. Solverealworld problemsinvolvingGraph,Tree,Heap(Apply)
- 5. Evaluate the suitability of different data structures for solving computing problems and Develop dynamic programming algorithms for various real-time applications. (Analyze)

ReferenceBooks

- 1. Introduction Algorithm in C A Step by Step guide to algorithm in C Author LucianooMandhi Published Jan 2020
- 2. Datastructure with C Seymur Lipschitz 2011 Tata MC Graw-hill

WebResources

- 3. <u>https://www.coursera.org/specializations/data-structures-algorithms-tsinghua</u>
- 4. <u>https://www.coursera.org/specializations/boulder-data-structures-algorithms</u>

С	РО	PO	PO	PO	PO	PO	РО	PO	PO	PO1	PO1	PSO	PSO	PSO3
0	1	2	3	4	5	6	7	8	9	0	1	1	2	
1	3	3	3									3		
2	3	3			3							3	3	3
3	2	2	3	3	3	3				2	2	3	3	3
4			3	3	3	3				2	2	3	3	3
5		3	3	3		3				2	2	3	3	3

COVsPOMappingandCOVsPSOMapping

BLOOMSLEVELASSESSMENTPATTERN

BLOOMSCATE GORY	ModelExam	ENDSEMEX AM
REMEMBER		
UNDERSTAN D		
APPLY	100	100
ANALYZE		
EVALUATE		
CREATE		

Prepared by

Verified by

MRS.R.GOMATHISELVI,AP/AI&DS

DR.A.ANITHA,HOD/AI&DS

24 \ 13612	Data Science Job	L	Т	Р	С	
		0	0	4	2	
Preamble						
This course en objective of the analysis, and	ncompasses the use of mathematics, statistics, and computer science to study and his course is to extract valuable information for strategic decision making, produce forecasting.	evalu uct de	ate dat velopn	a. The kneme has a second s	key end	
Prerequisites	s for the course					
• 24MA3	201 Mathematics for Data Science					
• 24CS25	01 - Introduction to Computing using Python					
Objectives						
 Under To Pro Expos To acc To imposite 	stand the Python Programming packages Python,Numpy,Scipy,Pandas,Matplotlik epare data for data analysis through understanding its distribution. ure on data processing using NUMPY and PANDAS. quire knowledge in plotting using visualization tools. plement classification and Regression Model.	o,statr	nodels,	seaborr	1.	
S.No	List of Experiments	СО				
1.	1. Data Exploration in House Prices Dataset. - Array indexing, slicing, Reshaping, splitting, concatenation. - Aggregation operations using Numpy. - Broadcasting and sorting with Numpy.		CO1			
2.	Program to implement k-NN classification using Breast Cancer Wisconsin Datasetavailable in the public domain and find the accuracy of the algorithm	n CO2				
3.	Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set.	³ CO2				
4.	 4. Data Cleaning and Preparation in the Diabetes Dataset. - Handling, filtering, filling missing data - Data Transformation operation like removing, renaming - Discretization and Binning 		CO3			
5.	Develop python program for Basic plots using Matplotlib.		CC)4		
6.	Apply and explore various plotting functions on UCI data sets. a. Normal curves	CO4				

	b. Density and contour plots	
	c. Correlation and scatter plots	
	d. Histograms	
	e. Three dimensional plotting.	
7.	Visualizing Geographic Data with Basemap.	CO4
8.	Implement linear regression to predict temperature using a weather dataset that includes variables such as humidity, wind speed, and atmospheric pressure.	CO5
9.	 Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following: a. Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis. b. Bivariate analysis: Linear and logistic regression modeling c. Multiple Regression analysis d. Also compare the results of the above analysis for the two data sets. 	CO5
10.	Program to implement linear and multiple regression techniques using Student PerformanceDatasetavailable in the public domain and evaluate its performance.	CO5

			r
S.No.	List of Projects	Related Experiment	CO
1.	Predicting Loan Eligibility.	2,3,6	CO1
2.	Exploratory Data Analysis on COVID-19 Data	1,3,7	CO1
3.	Detecting Parkinson's Disease	1,2,8	C01
4.	E-commerce Product Recommendation System.	2,3,6	CO2
5.	Customer Churn Prediction	2,3,5,6	CO2
6.	Color detection	7,9	CO3
7.	Gender and Age detection	2,4,7	CO3
8.	Uber data analysis project	7,9, 10	CO3
9.	Weather Data Analysis and Visualization	5,7,9	CO4
10	Financial Forecasting	4,6,7	CO4

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11	Handwritten Digit Recognition	2,4,7	CO4
12	Sentiment Analysis of Social Media Data	8,7,4	CO5
13	Customer segmentation	4,7,8,9	CO5
14	Product bundle identification	4,8,9	CO5
15	Heart Disease Prediction	2,4,8	CO5
16	Traffic Accident Analysis	9,10	CO5
T-4-11			

Total	Periods	:	45	
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	Suggestive Assessment Methods						
	Lab Components Assessments	End Semester Exams					
(60 Marks)		(40 Marks)					
•	Lab Experiment						
•	Viva	Dractical Exam					
•	Model Exam	• Flactical Exam					
•	Test Projects						

Outcomes: Students can able to

CO COURSE OUTCOMES: At the end of this course students can able to

Course Outcome 1 (CO1):

• Understand and effectively use essential Python libraries like **NumPy**, **SciPy**, **Pandas**, **Matplotlib**, **Statsmodels**, and **Seaborn** for data science applications.

Course Outcome 2(CO2):

• Analyse data interpretation for better insights into data structure and central tendencies with the use of descriptive statistics.

Course Outcome 3(CO3):

• Develop expertise in data processing using NumPy and Pandas for efficient data manipulation.

Course Outcome 4(CO4):

• Create various types of data visualizations using Matplotlib and Seaborn to explore data patterns and trends.

Course Outcome 5(CO5):

• Evaluate and fine-tune model performance, developing the ability to apply these models to solve real-world problems in domains such as finance, healthcare, and social science.

Laboratory Requirements:

- Desktop Systems: 30 Nos
- Python 3.11
- Anaconda Navigator/Jupyter/Spyder/Colab

Reference Books

- 1. Wes McKinney,"Python for data analysis",O'Reilly Media. Third edition, 2022
- 2. Introducing Data Science : Big data, machine learning, and more, using Python tools,
- 3. <u>Arno D. B. Meysman Davy Cielen& Mohamed Ali</u>, 2016, 1st edition , Manning Publications.

Web Resources

1.<u>https://onlinecourses.nptel.ac.in/noc22_cs74/preview</u>

2.https://towardsdatascience.com/

CO Vs PO Mapping and CO Vs PSO Mapping

С	PO	PO1	PO1	PSO	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3									3		
2	3	2		3	3							3	3	3
3			3	3	3							3	3	3
4		3	3	3	3							3	3	3
5		3	3	3	3							3	3	3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	Model Exam	END SEM EXAM
REMEMBER		
UNDERSTAND		

APPLY	100	100
ANALYZE		
EVALUATE		
CREATE		

COURSE LEVEL ASSESSMENT QUESTIONS

Course Outcome 1 (CO1):

- 1. Write a program using Numpy to generate a random array and perform element-wise mathematical operations such as addition and scaling. Describe a scenario where each operation would be useful in data processing.(APPLY)
- 2. Create a basic plot using Matplotlib to represent categorical data (e.g., bar plot or pie chart). Customize the plot with labels and colors to improve readability. Explain how this visualization helps convey the information.(**APPLY**)

Course Outcome 2 (CO2):

- 1. Calculate and interpret the mean, median, and mode for a given dataset. Then, visualize the data distribution with a histogram. What do these measures reveal about the data?(APPLY)
- 2. Use Pandas to group data by a categorical variable and compute summary statistics for each group (e.g., mean, variance). What patterns or trends can you identify?(**APPLY**)

Course Outcome 3 (CO3):

- 1. Load a dataset into Pandas, handle missing values, and perform filtering and transformation operations. Describe each step and explain how it prepares the data for analysis.(APPLY)
- 2. Aggregate data in Pandas using grouping operations and calculate aggregate statistics such as sum, mean, and count for different groups. Explain what these statistics reveal about the data.(APPLY)

Course Outcome 4 (CO4):

- 1. Create a correlation heatmap using Seaborn to visualize relationships among multiple variables in a dataset. What does the heatmap reveal about variable relationships?(**APPLY**)
- Apply different types of plots (e.g., histogram, box plot, density plot) to a continuous variable. Describe how each plot type contributes to understanding the data's distribution. (APPLY)

Course Outcome 5 (CO5):

- 1. Implement a linear regression model to predict a continuous variable. Interpret the model's slope, intercept, and R-squared value to evaluate model fit.(**APPLY**)
- 2. Using logistic regression, classify a binary outcome variable and evaluate the model's performance. Explain the importance of the odds ratio and how it impacts interpretation. (APPLY)

Prepared by MS.VARSHATH NIKILA , AP/AI&DS Verified by DRA.ANITHA, HOD/AI&DS

S.N O	Course Code	Course Name	Category	Contact Periods	L	Т	P	C				
Theory Courses												
1	24HS4101	Professional Ethics and Human values	HSSM	2	2	0	0	2				
2	24MA4201	Discrete Mathematics	BS	3	3	1	0	4				
3	24AI4601	Data Analytics	PC	3	3	1	0	4				
4	24AI4602	Artificial Intelligence and Expert Systems	PC	3	3	0	0	3				
5		Open Elective- II	OE	3	3	0	0	3				
		Theory Cum practi	cal Courses									
1	24IT4603	Operating Systems	PC	4	2	0	2	3				
		Practical Co	urses									
1	24AI4611	Data Analytics laboratory	PC	4	0	0	4	2				
2	24AI4612	Artificial Intelligence lab	PC	4	0	0	4	2				
3	24PT3901	3901 SoftSkills–Aptitude1		2	0	0	2	1				
4	24GE4911	Design Thinking Project	EEC	1	0	0	2	1				
		Total		30	16	2	14	25				

SEMESTER IV

			L	Т	Р	C
24A14601 Data Analytics		3	1	0	4	
Preamble						
This course involved in industrial da industrial ch	e woul develo atasets halleng	d gain a general understanding of the procedures, technical skills, oping data analytics solutions. Students will be introduced to a few s. It would be demonstrated how to construct applications for utiliz ges step-by-step.	and be Open ingthe	est pra sourc e data t	ctices e o solve	9
Prerequisite	es for t	he course				
• 24AI36	602- E	Data Science Using python				
Objectives						
The	cours	se will enable students:				
• To dev	velop s	kills in collecting, cleaning, and preprocessing data for analysis.				
• To equ	ip stu	dents with statistical and machine learning techniques for data inte	erpreta	ation.		
• To tead	ch data	a visualization methods for effectively presenting insights and tren	nds.			
• To ena	ble stu	udents to apply data-driven decision-making in real-world scenario	DS.			
• To prep various	pare s s indu	tudents to solve complex problems by leveraging analytics tools as stries.	nd tec	hnique	s acros	SS
UNIT I		ANALYSIS				
		TECHNIQUES				
Elements, Variables, and Data categorization- Levels of Measurement- Data management and indexing- Introduction to statistical learning and R- Programming- Measures of central tendency- Measures of location of dispersions Practice and analysis with R- Basic Analysis Techniques					1:	2
SUGGEST	'ED A	CTIVITIES:				
PracSem	ctical c ninar o	on Visualization of data n Data management and Indexing				
SUGGEST	ED E	VALUATION METHODS:				
• Assi	ignme	nt Problem				
• Quiz	zzes					
		EXPLORATORY DATA ANALYSIS				
UNIT II	EDA with o techn Grouj	Fundamentals-Significance of EDA-Making sense of data-Comp classical and Bayesian analysis-Software tools for EDA-Data tran iques-Merging database, reshaping and pivoting,Transformation t ping data sets-data aggregation-Pivot tables and cross tabulations.	oaring nsforn echnic	EDA nation ques -	1:	2

Francis Xavier Engineering College/ Dept of AI& DS/R2024/Curriculum and Syllabi/VIII Board of Studies

SUGGES	FED ACTIVITIES.						
	ation. Eind Skownoog on conque dataget						
• Pra	cucal- Find Skewness on census dataset						
SUGGEST	TED EVALUATION METHODS:						
• Ass	signment Problem						
• Tut	• Tutorial Problem						
• Qui	izzes						
	TIME-SERIES,RANKING AND						
	DEVIATION ANALYSIS						
UNIT III	UNIT IIITime-series analysis – time-series patterns – time-series displays – time-series best practices – part-to-whole and ranking patterns – part-to-whole and ranking displays – best practices – deviation analysis – deviation analysis displays – 						
SUGGEST	TED ACTIVITIES:						
• Imp	plementation of data collection using distribution plot						
• Apj	plications of data analysis techniques						
SUGGES	TED EVALUATION METHODS:						
• Ass	signment Problem						
• Qui	izzes						
	PREDICTIVE ANALYTICS						
UNIT IV	Linear least squares – implementation – goodness of fit – testing a linear model – weighted resampling. Regression using StatsModels – multiple regression – nonlinear relationships – logisticregression – estimating parameters – Time series analysis – moving averages – missing values –serial correlation – autocorrelation. Introduction to survival analysis.	12					
SUGGEST	TED ACTIVITIES:						
	• Implementation of data frames in R						
SUGGEST	TED EVALUATION METHODS:						
• Tut	orial problems						
• Ass	• Assignment problems						
• Quizzes							
DISTRI	BUTION,CORRELATION AND MULTI-VARIATE ANALYSIS						

UNIT V	Distribution analysis – desc distribution displays –distribution describing correlations – correl analysis techniques and best patterns – multivariate display practices	ribing distributions – distr on analysis best practices – co ation patterns – correlation di practices – multivariate anal ys – multivariate analysis to	ibution j orrelation splays – lysis – n echniques	patterns – analysis – correlation nultivariate 12 and best		
SUGGES	FED ACTIVITIES:					
	 Practical- Plotting with layers Implementation of survival A 	s using algorithms				
SUGGES	FED EVALUATION METHOD	S:				
• Tut	orial problems					
• Tut						
• Pro	ject demonstration					
• Ass	signment problems					
• Qu	izzes					
		Total P	eriods	60		
Continuous Marks)	s Assessment Test (20	FormativeAssessment Test (20 Marks)	End So Marks	emester Exams (60 3)		
1. DESCRIPTIVE TYPE QUESTIONS1. ASSIGNMENT1. DESCRIPTIVE2. CASE BASED QUESTIONS2. ONLINEQUESTIONSQUIZZES3. PROBLEM –2. CASE BASED QUESTIONGACTIVITIES2. CASE BASED QUESTIONS						
Outcomes		I				

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

CO1 Understand the fundamental concepts of data elements, variables, and levels of measurement, enabling them to classify and organize data effectively.

CO2 Develop the ability to interpret and make sense of complex datasets using EDA techniques and learn to compare and contrast EDA with classical and Bayesian analysis approaches.

CO3Acquire skills forgain proficiency in conducting deviation analysis, identifying and interpreting deviations in datasets, and designing effective deviation analysis displays.

CO4Apply linear least squares techniques to implement and evaluate linear models, assess goodness of fit, and perform hypothesis testing for linear relationships.

CO5 Analyze distributions by describing their characteristics, identifying distribution patterns, and evaluating distribution displays while adhering to best practices.

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T	ext Bo	ooks														
		1.	Rob and	Robert Knell, "Introductory R: A Beginner's Guide to Data Visualisation, Statistical Analysis and Programming in R", Amazon Digital South Asia Services Inc, 2021.												
		2.	Jeffr	Jeffrey Aven (2023), "Fundamentals of Data Analytics" – Wiley.												
		3.	Hadley Wickham and Garrett Grolemund (2023), "R for Data Science" - O'Reilly Media													
R	eferei	ice B	ooks													
		1.	Tho	omas N	/lailun	d,"Dat	a Ana	lysis, '	Visual	ization	, and Mo	delling fo	r the Data	a Scien	tist",	
			201	7.												
		2.	"Da	ata Sci	ence 8	z Big I	Data A	nalyti	cs: Dis	scoveri	ng, Anal	yzing, Vis	sualizing a	and Pro	esenting	3
			Dat	Data", EMC ² , Wiley Publications, First Edition 2015Data Science from Scratch, Joel												
			Gru	ıs,First	Editio	on 201	5, O'F	Reilly.								
W	eb R	esour	ces													
		1. 2.	http http	os://np os://wv	tel.ac.i vw.dat	n/cour acamp	rses/10 .com/	61072	20							
CC) Vs F	PO M	appir	ng and	CO V	s PSC) Map	oping								
	С	P	Р	P	P	Р	Р	P	P	P	РО	PO1	PS	P	PS	
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		1	2	3	4	5	6	7	8	9	0			0 2	3	
															ļ	1

BLOOOMS LEVEL ASSESSMENT PATTERN

BLOOM'S CATEGORY	CON	ΓINUOUS TES	MENT	END SEMESTER FX A MINA TI		
	CAT – 1	CAT - 2	FAT 1	FAT 2	ON	

REMEMBER	10	10			10	
UNDERSTA ND	20	20	5	5	10	
APPLY	60	60	10	10	60	
ANALYZE	10	10	10	10	40	
EVALUATE	0	0			0	
CREATE	0	0			0	

COURSE LEVEL ASSESSMENT QUESTION

COURSE OUTCOME 1(CO1):

1.Using the data provided, categorize the variables into appropriate types (nominal, ordinal, interval, ratio). Then, using R, calculate the mean and median total amount spent across different customer segments (e.g., by age group or product category). How can these measures help in identifying patterns or trends within the customer base?

2. After reviewing the dataset, identify any missing or inconsistent data points. Using R, clean the dataset by handling missing values (e.g., through imputation or removal). Then, calculate the standard deviation and range of task completion and job satisfaction scores across different departments. How do these measures of dispersion help in understanding variability in productivity within each department?

COURSE OUTCOME 2(CO2):

1. Using R, perform an exploratory data analysis (EDA) on the provided sales dataset. Begin by generating summary statistics and visualizations (e.g., histograms, box plots) for key variables such as sales figures and promotional discounts. Then, apply data transformation techniques, such as merging sales data with additional customer demographics and reshaping the dataset to focus on product categories. How do these transformations help you understand the factors influencing sales trends?

2. Using the provided employee survey data, group the dataset by department and calculate the average job satisfaction scores for each department. Then, create pivot tables and cross-tabulations to analyze how satisfaction scores correlate with other factors such as compensation and work-life balance. How do these aggregation and transformation techniques support the identification of trends and patterns that can guide HR decision-making?

COURSE OUTCOME 3(CO3):

1.Using the provided monthly revenue data, apply time-series analysis to identify patterns such as seasonality and trends. Create time-series displays to visualize the data, and apply deviation analysis to detect any anomalies or outliers in revenue. How can you use these displays and analysis techniques to make predictions about future revenue and improve business planning?

2. Using the provided sales data, create part-to-whole displays to show the contribution of each region to total sales. Additionally, use ranking patterns to rank regions based on their
sales performance. Apply best practices for displaying these patterns and interpret how the results can inform strategic decisions about resource allocation and regional marketing efforts.

COURSE OUTCOME 4(CO4):

1.Using the provided dataset, implement a multiple regression model in StatsModels to predict housing prices based on the given features (square footage, number of bedrooms, etc.)Evaluate the model's goodness of fit using R-squared and adjusted R-squared values. Discuss the significance of the estimated parameters and interpret them. How would you assess the presence of nonlinear relationships between the variables, and how could you address them in your model?

2. Using the provided sales data, conduct a time-series analysis to identify trends, seasonality, and irregularities. Use moving averages to smooth the data and generate forecasts. Check for serial correlation and autocorrelation in the residuals to assess model performance. Additionally, handle any missing values in the dataset and discuss how they might impact the forecast. Based on your analysis, provide a forecast for the next 6 months and explain the key factors that will influence sales during that period.

COURSE OUTCOME 5(CO5):

1.Describe the distribution of variables such as age, income, and total purchase amount. Create distribution displays (e.g., histograms, box plots) for each variable. Then, perform a correlation analysis to examine the relationships between income, age, and total purchase amount. Create correlation displays (e.g., heatmaps) and identify any significant correlation patterns. How would you apply best practices in correlation analysis to ensure the results are meaningful and not misleading?

2. Using the marketing and sales data, perform a multivariate analysis to examine how marketing spend, website traffic, and social media engagement impact sales performance. Create appropriate multivariate displays (e.g., scatterplot matrices, 3D plots). Identify any multivariate patterns and explain how these relationships can guide future marketing strategies. How would you apply best practices in multivariate analysis to ensure that the results are reliable and actionable for decision-making?

Prepared by		Verif	ied by			
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Preamble						

The goal of the lab is to provide hands-on experience with data analysis techniques, tools, and methodologies used to turn raw data into valuable insights. Here, you'll work with real-world datasets, apply statistical and machine learning models, and use visualization techniques to interpret results. Our goal is to equip you with practical skills for data-driven decision-making. Let's dive in and unlock the power of data together.

Prerequisites for the course

• 24AI3612 Data Science lab

Objectives

- 1. To Understand and apply techniques to gather, clean, and preprocess data for accurate analysis.
- 2. To Develop skills in exploratory data analysis and data visualization to uncover patterns and trends.
- 3. To Apply statistical and machine learning models to make predictions and derive insights from data.
- 4. To Learn to evaluate model performance and interpret results for actionable insights.
- 5. To Gain practical experience with tools like Python, R, SQL, and visualization software to solve data problems effectively.

S.No	List of Experiments	СО
1	Create a vector in R and perform operations on it	CO1
2	Create integer, complex, logical, character data type objects in R and print their values and their class using print and class functions.	ICO1
3	Write code in R to demonstrate sum(), min(), max() and seq() functions.	CO1
4	Write code in R to manipulate text in R using grep(), toupper() tolower() and substr() functions.	,CO2
5	Write a program that utilizes Grouping, loops and conditional execution Functions Exploratory data analysis on a givenCustomerdataset with information about a fictional set of customers, their age, annual income and whether they purchased a product.	,CO2
6	Develop a program to calculate basic statistics such as Range, summary mean, variance, median, standard deviation, histogram, box plot scatterplot with the givenFacultyId,Age,Salary,Experience.	,CO3 ,
7	Write code in R to demonstrate Expressions and Data Structures with students, with information on their grades, age, and field of study.	nCO3

8	Create a program to generate and visualize 3D plots in R using sample CO4 datasets which simulates information about different products, including their prices, ratings, and sales.	
9	Develop a program Build tables using aggregate function for the CO5 information which includes patient information, such as age, gender, diagnosis, and treatment costs.	
10	Write a program to Read and Write different types of Datasets in R with CO5 information such as transaction ID, customer ID, product category, product price, quantity purchased, and the total price for each transaction.	

S.No	List of Projects	RelatedE xperiment	СО
1.	Customer Segmentation : Use clustering techniques to group customers based on purchasing behaviors for targeted marketing.	Ex.1to10	CO2
2.	Sales Forecasting : Build time-series models to predict future sales based on historical data.	Ex.1to10	CO2
3.	Sentiment Analysis : Analyze social media or customer review text data to determine public sentiment on products or services.	Ex.1to10	CO3
4.	Churn Prediction : Develop models to predict which customers are likely to stop using a service or product.	Ex.1to10	CO3
5.	Healthcare Data Analysis: Examine patient data to identify risk factors for diseases or predict patient outcomes.	Ex.1to10	CO4
6.	Market Basket Analysis: Use association rule mining to identify frequently bought product combinations for cross-selling.	Ex.1to10	CO4
7.	Financial Fraud Detection : Build a classification model to detect fraudulent transactions in banking data.	Ex.1to10	CO5
8.	Credit Scoring : Develop a model to assess the creditworthiness of loan applicants based on historical loan data.	Ex.1to10	CO5
9.	Employee Attrition Analysis : Analyze HR data to identify patterns in employee turnover and suggest retention strategies.	Ex.1to10	CO5
10.	Energy Consumption Forecasting : Use historical data to forecast energy demand for efficient energy management	Ex.1to10	CO5

COVs POM apping and COVs PSOM apping

С	PO	PO1	PO1	PSO	PSO	PSO								
Ο	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3			2						1		
2	3	3	3	3	3	2						1	3	3

3	3	3	3	3	3	2		3	3	2	3	3
4	3	3	3	3	3	2		3	3	2	3	3
5	3	3	3	3	3	2		3	3	3	3	3

BLOOMSLEVELASSESSMENTPATTERN

BLOOMSC ATEGORY	CAT1	CAT2	FAT1	FAT2	ENDSEM EXAM
REMEMBER	10	10	5	5	10
UNDERSTAND	20	20	10	10	20
APPLY	50	50	5	5	50
ANALYZE	20	20	5	5	20
EVALUATE					
CREATE					

COURSELEVELASSESSMENTQUESTIONS

CourseOutcome1 (CO1):(Apply)

- 1. Given a real-world problem, design an intelligent agent framework to address it.
- 2. Analyze a given intelligent agent's decision-making process and identify the underlying framework used.

CourseOutcome2 (CO2):(Apply)

- 1. Compare the efficiency of various problem-solving techniques (e.g., BFS vs. DFS) on different types of problems.
- 2. Evaluate the effectiveness of a problem-solving approach in terms of time complexity and optimality.

CourseOutcome3 (CO3):(Apply)

- 1. Compare the efficiency of different CSP solving techniques.
- 2. Design a custom game and implement an AI player using game-playing techniques and strategies.

Course Outcome 4(CO4):(Apply)

- 1. Apply logical reasoning to draw conclusions from a set of premises using forward or backward chaining.
- 2. Design a logical reasoning system that can solve a real-world problem, such as medical diagnosis or legal reasoning.

CourseOutcome 5(CO5):(Apply)

1. Evaluate the effectiveness of probabilistic reasoning techniques in handling uncertainty in AI

models.

2. Create a probabilistic model to solve a problem under uncertainty, such as predicting stock market trends or diagnosing diseases.

Reference Books

1. Practical Statistics for data Science, Peter Bruce , Andrew Bruce , May 2017, First Edition, O'Reilly

2. Data Science from Scratch, Joel Grus, First Edition 2015, O'Reilly.

3. Advances in Complex Data Modeling and Computational Methods in Statistics, Anna Maria Paganoni and Piercesare Secchi, Springer, 2013

4. Data Mining and Analysis, Mohammed J. Zaki, Wagner Meira, Cambridge, 2012

Web Resourses

1.https://www.altair.com/data-analytics/ 2.https://www.ibm.com/in-

en/analytics/hadoop/big-data-analytics

 $\label{eq:2.1} 3. https://datascience.foundation/sciencewhitepaper/big-data-analytics-idea-data-types-and-reference-$

Prepared by MRS.R.JOTHI JEYASHREE, AP/AI&DS Verified by DR.A.ANITHA, HOD/AI&DS

SYSTEMS 3 0 0 Preamble The fundamental ideas and methods of artificial intelligence is focused on developing the software and hardware a computer science known as artificial intelligence is focused on developing the software and hardware and eccessary to enable computers to perform actions that would be regarded as intelligent if it is similations carried out by people. The students in this course will learn general problem-solving techniques they can use to solve a variety of issues in the real world. Students can discover how computers can reason, interact, solve problems, and learn. Prerequisitesforthecourse • 21CS1501 – Problem solving and logical thinking using C • 21CS1501 – Problem solving and logical thinking using C • 1. To understand the basics of Intelligent Agents and their problem-solving approaches • 2. 1. To understand the basics of Intelligent Agents and their problem-solving approaches • 2. 2. To explore advanced search techniques and optimization strategies in AI • 1. 3. To learn game theory and solve constraint satisfaction problems effectively • 1. 4. To understand logical reasoning and knowledge representation techniques • 9 9 Introduction to AI – Agents and Environments – concept of rationality – nature of environment structure of agents. Problem solving agents – search algorithms – uninformed search strategies. 9 9 Demonstration of rational agents in various environments. 9 9 Online Quiz </th <th>24 4 14602</th> <th>ARTIFICIAL INTELLIGENCE AND EXPERT</th> <th>L</th> <th>Т</th> <th>Р</th> <th>С</th>	24 4 14602	ARTIFICIAL INTELLIGENCE AND EXPERT	L	Т	Р	С
Preamble The fundamental ideas and methods of artificial intelligence are covered in this course. The subarea o computer science known as artificial intelligence is focused on developing the software and hardware necessary to enable computers to perform actions that would be regarded as intelligent if it is simil those carried out by people. The students in this course will learn general problem-solving techniques they can use to solve a variety of issues in the real world. Students can discover how computers can reason, interact, solve problems, and learn. Prerequisitesforthecourse • 21CS1501 - Problem solving and logical thinking using C • 21CS2501 - Introduction to Computing using Python Objectives 1. To understand the basics of Intelligent Agents and their problem-solving approaches 2. 2. To explore advanced search techniques and optimization strategies in AI 3. 3. To learn game theory and solve constraint satisfaction problems effectively 4. 4. To understand logical reasoning and manage uncertainty in AI systems 9 Introduction to AI – Agents and Environments – concept of rationality – nature of environment structure of agents. Problem solving agents – search algorithms – uninformed search strategies. 9 SUGGESTEDACTIVITIES 9 Heuristic search strategies – heuristic functions - Local search and optimization problems – local sea in continuous space – search with non-deterministic actions – search in partially observa environments – online search agents and unknown environments	24/14002	SYSTEMS	3	0	0	3
The fundamental ideas and methods of artificial intelligence are covered in this course. The subarea o computer science known as artificial intelligence is focused on developing the software and hardware necessary to enable computers to perform actions that would be regarded as intelligent if it is similit hose carried out by people. The students in this course will learn general problem-solving techniques they can use to solve a variety of issues in the real world. Students can discover how computers can reason, interact, solve problems, and learn. Percequisitesforthecourse 21CS1501 – Problem solving and logical thinking using C 21CS2501 - Introduction to Computing using Python Objectives 1. To understand the basics of Intelligent Agents and their problem-solving approaches 2. To explore advanced search techniques and optimization strategies in AI 3. To learn game theory and solve constraint satisfaction problems effectively 4. To understand logical reasoning and manage uncertainty in AI systems INTELLIGENT AGENTS 9 Introduction to AI – Agents and Environments – concept of rationality – nature of environment structure of agents. Problem solving agents – search algorithms – uninformed search strategies. SUGGESTEDACTIVITIES 00 Inine Quiz Assignment Methods UNITI Advanced Search Techniques and Optimization 9 Heuristic search strategies – heuristic functions - Local search and optimization problems – local sea in continuous space – search with non-deterministic actions – search in partially observa environments – online search agents and unknown environments	Preamble					
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Online Quiz Assignment Methods UNITII Advanced Search Techniques and Optimization 9 Heuristic search strategies – heuristic functions - Local search and optimization problems – local sea in continuous space – search with non-deterministic actions – search in partially observa environments – online search agents and unknown environments SUGGESTEDACTIVITIES	structure of agen SUGGESTED • Demons	nts. Problem solving agents – search algorithms – uninformed sear ACTIVITIES tration of rational agents in various environments.	ch stra	ategie	es.	
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UNITII Advanced Search Techniques and Optimization 9 Heuristic search strategies – heuristic functions - Local search and optimization problems – local sea in continuous space – search with non-deterministic actions – search in partially observa environments – online search agents and unknown environments SUGGESTEDACTIVITIES Environments – online search agents and unknown environments Environments – online search agents and unknown environments	OnlineAssignment	Quiz ment Methods				
Heuristic search strategies – heuristic functions - Local search and optimization problems – local sea in continuous space – search with non-deterministic actions – search in partially observa environments – online search agents and unknown environments SUGGESTEDACTIVITIES	UNITII	Advanced Search Techniques and Optimization				9
SUGGESTEDACTIVITIES	Heuristic searc in continuous environments -	h strategies – heuristic functions - Local search and optimization p space – search with non-deterministic actions – search in online search agents and unknown environments	problen n part	ms – ially	local s obser	search rvable
In the second seco	SUGGESTED	ACTIVITIES				
 Implementation of Heuristic Search Algorithms Discussion on Local Search Techniques and their Applications in Real-World Optimization Problems 	ImplemDiscussProblem	entation of Heuristic Search Algorithms sion on Local Search Techniques and their Applications in Real-W ns	orld C	Optin	nizatio	n

- Online Quiz
- Assignment Methods

UNITIII	Game Theory and Constraint Satisfaction
• - ·	

Game theory – optimal decisions in games – alpha-beta search – monte-carlo tree search – stochastic games – partially observable games. Constraint satisfaction problems – constraint propagation – backtracking search for CSP – local search for CSP – structure of CSP.

SUGGESTEDACTIVITIES

- Implementation of Alpha-Beta Pruning Algorithm for Optimal Game Decision-Making
- Simulation of a Constraint Satisfaction Problem (CSP) using Backtracking and Local Search

SUGGESTEDEVALUATIONMETHODS

- Online Quiz
- Assignment Methods

UNITIV Logical Agents and Knowledge Representation

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

SUGGESTEDACTIVITIES

- Demonstration of Propositional Logic Applications in Knowledge-Based Agents
- Discussion on First-Order Logic in Knowledge Representation

SUGGESTEDEVALUATIONMETHODS

- Online Quiz
- Assignment Methods

UNITV Probabilistic Reasoning and Uncertainty Management

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

SUGGESTEDACTIVITIES

- Implementing Naïve Bayes Classifier for Probabilistic Inference
- Building and Analyzing a Bayesian Network

SUGGESTEDEVALUATIONMETHODS

- Online Quiz
- Assignment Methods

9

9

9

	Tota	IPeriods	45
SuggestiveAssessmentMethods			
ContinuousAssessmentTest	FormativeAssessmentTest	End	SemesterExams
	(20Marks)		
(20Marks)	(20Marks)		(601vlarks)
1. DESCRIPTIVEQUESTIONS	1.ASSIGNMENT	1.DESCH	RIPTIVE
2 PROGRAMING	2 ONLINEOUIZZES	QUESTI	ONS
ANDPROBLEMSOLVI		2. PROG	RAMING
NGQUESTIONS	3.PROBLEM-	ANDPRO	OBLEMSOLVI
	SOLVINGACTIVITIES	NGQUE	STIONS
CourseOutcomes			
Uponcompletionofthecourse,thes	tudentswillbeableto:		
CO2: Implement and apply problem CO3: Apply game playing and com CO4: Analyze and perform logical CO5: Evaluate the probabilistic rea	m-solving techniques estraint satisfaction problem (CSP) te reasoning asoning under uncertainty	chniques to	solve problems
Text Books			
1. Stuart Russell and Peter No.	orvig, "Artificial Intelligence – A Mo	dern Appro	ach", Fourth
Edition, Pearson Education	, 2021.		
2. BeecherK.ComputationalT	hinking:Abeginner'sguidetoProblem-		
solvingandProgramming.B	CSLearning&DevelopmentLimited,2	2017.	
ReferenceBooks			
1. ByronGottfried"Programmi	ngWithC"FourthEdition,McGrawHil	1, 2018.	
2. YashvantP.Kanetkar."LetUs	sC",BPBPublications, 2016.		
WebResources			
1. <u>https://www.javatpoint.con</u>	n/artificial-intelligence-ai		
2. https://onlinecourses.nptel.	ac.in/noc22_cs56/preview	•	6.1
5. <u>https://www.tutorialspoint.</u>	com/artificial_intelligence/artificial_	<u>intelligence</u>	<u>useful</u> resources.ht
4. <u>https://www.w3schools.com</u>	<u>n/ai/ai_whatis.asp</u>		
-			

${\bf COVsPOM apping and COVsPSOM apping}$

С	PO	PO1	PO1	PSO	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3			2						1		

2	3	3	3		2			1	
3	3	3	3		2			2	
4	3	3	3		2			2	
5	3	3	3		2			3	

BLOOMSLEVELASSESSMENTPATTERN

BLOOMSC ATEGORY	CAT1	CAT2	FAT1	FAT2	ENDSEM EXAM
REMEMBER	10	10	5	5	10
UNDERSTAND	20	20	10	10	20
APPLY	50	50	5	5	50
ANALYZE	20	20	5	5	20
EVALUATE					
CREATE					

COURSELEVELASSESSMENTQUESTIONS

CourseOutcome1 (CO1):(Apply)

1.Imagine an autonomous drone is deployed for delivery. Describe how the concept of rationality applies when the environment has sudden obstacles like birds or wind gusts. 2.Analyze a given intelligent agent's decision-making process and identify the underlying framework used.

CourseOutcome2 (CO2):(Apply)

1.Develop a heuristic function for solving the 8-puzzle problem and implement the A^* search algorithm to solve it..

2.Evaluate the effectiveness of a problem-solving approach in terms of time complexity and optimality.

CourseOutcome3 (CO3):(Apply)

1.A scheduling problem involves assigning teachers to classrooms while ensuring no two teachers are in the same room simultaneously. How can you approach this using constraint satisfaction?

2.Design a custom game and implement an AI player using game-playing techniques and strategies.

Course Outcome 4(CO4):(Apply)

1.An intelligent agent needs to determine whether a given sentence is logically consistent with its knowledge base. How would you design the agent to use propositional logic for this task?

2.Design a logical reasoning system that can solve a real-world problem, such as medical diagnosis or legal reasoning.

CourseOutcome 5(CO5):(Apply)

1.Construct a Bayesian network for a simple burglary alarm system and implement exact inference to determine the probability of a burglary given that the alarm is triggered.

2.Create a probabilistic model to solve a problem under uncertainty, such as predicting stock market trends or diagnosing diseases.

Prepared by

MS.S.ANGEL,

AP/AI&DS

Verified by DR.A.ANITHA, HOD/AI&DS

21 4 14(12		L	Т	Р	С
21A14012	Artificial Intelligence lab	0	0	4	2
Preamble					
The goal of the	ne practice lab is toprovide the students with foundation	n in compi	iter n	rooran	nmino
toenhance the	problemsolving skills related to the field of engineering	y It enable	s the	algori	ithmic
approachamong	the students to solve real world problems thus providing	the base to	o leari	1 othe	r new
programmingla	nguages				
Prerequisitesfor	thecourse				
• 21CS1511	– PSLC Lab				
Objectives					
1. To desig	n and implement search strategies				
2. To imple	ement game playing techniques				
3. To imple	ment CSP techniques				
4. To devel	op systems with logical reasoning				
5. To devel	op systems with probabilistic reasoning				
S.No	ListofExperime nts		CO		
1	Implementation of toy problems	CO1			
2	Developing agent programs for real world problems		CO1		
3	Implementation of constraint satisfaction problems		CO1		
4	Implementation and Analysis of DFS and BFS for an application		CO2		
5	Developing Best first search and A* Algorithm for real world problems		CO2		
6	Implementation of unification and resolution for real world problems.		CO3		
7	Implementation of learning algorithms for an application		CO3		

8	Development of ensemble model for an a	pplication	CO ²	4
9	Implementation of block world problem		CO4	4
10	Applying deep learning methods to solve	an application	CO4	4
S.No.	List ofProjects		RelatedE xperiment	СО
1.	Design and Implementation of Toy Pro	blems	Ex.1to10	CO1, CO3
2.	Development of Agent Programs for R Problems	eal-World	Ex.1to10	CO1, CO3
3.	Constraint Satisfaction Problem Solver	rs	Ex.1to10	CO1, CO3
4.	Analysis of Depth-First Search (DFS) a First Search (BFS) for Pathfinding Ap	and Breadth- plications	Ex.1to10	CO1, CO3, CO4
5.	Optimized Pathfinding with Best-First Se Algorithm	arch and A	Ex.1to10	CO1, CO3
б.	Unification and Logical Resolution for Based Systems	Knowledge-	Ex.1to10	CO1, CO3, CO4
7.	Machine Learning Algorithms for Spec Applications	cific	Ex.1to10	CO1, CO3, CO4
8.	Creating Ensemble Models for Predict	ive Analytics	Ex.1to10	CO2, CO4, CO5
9.	Block World Problem Solver using AI	Techniques	Ex.1to10	CO2, CO4, CO5
10.	Program to Implement MissionariesCann using Python	ibals Problems	Ex.1to10	CO2, CO4, CO5
SuggestiveAss	essmentMethods			
LabCompone	ntsAssessments	EndSemesterEx	ams	
(50Marks)	(50Marks)		

• Evereice	(Haakar rankaaara)	1 Papardnoto
• Exercise		1. Recorditote
• Projectr	lle(ProgressScore)	2. Exercises
• Vivavoc	e	5. VIVAVOCE
CourseOutcom	les	
Upon complet	ion ofthecourse,thestudentswillbeabl	eto:
C01	Apply various AI search algorithms satisfaction,).	(uninformed, informed, heuristic, constraint
CO2	Understand the fundamentals of know	owledge representation, inference.
CO3	Understand the fundamentals of the	corem proving using AI tools
CO4	Demonstrate working knowledge o uncertain information.	f reasoning in the presence of incomplete and/or
CO5	Apply AI techniques and technolog	ies to solve real world business problems.
LaboratorvR	equirements	
v		
• PR	OLOGandL1sp	
• Pyt	hon	
• System	withwindows	
Interne	t	
ReferenceBo	oks	
1. S.Russe	llandP.Norvig,ArtificialIntelligence:Al	ModernApproach, Prentice
Hall,Th	irdEdition,2009.	
2 Dratka	Drologi Drogrammingfor Astificially	talligenee Fourthedition Addison
2. Blacko, Wesley	/EducationalPublishersInc.,2011	nemgeneen, routileation, Addison-
WebResource	S	
1. https:// f95c4f590	hackernoon.com/16-best-resources-to 18b	o-learn-ai-machine-learning-in-2019-
 <u>https://</u> <u>https://wall</u> 	learndigital.withgoogle.com/digitalgates/261.sp98	arage/course/elements-artificial-intelligence. /lab-beginning-LISP-2.html
Prenared I)V	Verified by
Treparcu	- J	v childa by

MS.S.ANGEL,AP/AI&DS

DR.A.ANITHA,HOD/AI&DS

OPEN ELECTIVE

S.N	Course	Course Name	Sem	L	Т	Р	С
0	Code						
OPEN	ELECTIVE-I					<u> </u>	
1	24AI3801	Introduction to Machine Learning	3	3	0	0	3
2	24AI3802	AI in cyber security	3	3	0	0	3
3	24AI3803	Advancements in AI	3	3	0	0	3
4	24AI3804	Data Exploration Using Python	3	3	0	0	3
5	24AI3805	Data science essentials	3	3	0	0	3

24AI3801	Introduction to Machine Learning		Т	Р	С
		3	0	0	3
D 11					

Preamble

This course aims to provide the students with a foundation in Machine learning (ML) The focus isto figure out how students can build computer systems that improve over time and with repeated use. This will enable the students to improve their proficiency in applying thebasic algorithms to analyze large amounts of data, identify patterns, and make predictions. and knowledge of problem solving

Prerequisitesforthecourse

• NIL

Objectives

- 1. To understand the basic concepts of machine learning.
- 2. To understand and build supervised learning models.
- 3. To understand neural network and learn combination of classifiers
- 4. To understand and build unsupervised learning models.
- 5. To design and analysis of probabilistic graphical models

UNITI INTRODUCTION TO MACHINE LEARNING 8	
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Review of Linear Algebra for machine learning; Introduction and motivation for machine learning; Examples of machine learning applications, Vapnik-Chervonenkis (VC) dimension, Probably Approximately Correct (PAC) learning, Hypothesis spaces, Inductive bias, Generalization, Bias variance trade-off.

SUGGESTEDACTIVITIES

• Give an example from our daily life for each type of machine learning problem

SUGGESTEDEVALUATIONMETHODS

• Using Cross Validation and Holdout method verify the dataset

UNITII SUPERVISED LEARNING

Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Perceptron algorithm, Probabilistic discriminative model - Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random Forests-Engineering Case studies

SUGGESTEDACTIVITIES

• Study at least 3 Tools available for Machine Learning and discuss pros & cons of each

SUGGESTEDEVALUATIONMETHODS

Using AUC-ROC Curve analyze the classification model at different threshold values

11

UNITIII	ENSEMBLE TECH	INIQUES		9				
Combining mul	tiple learners: Model (combination schemes. Voting, Ensembl	e Learning - bag	ging, boosting.				
stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and								
Expectation max	ximization – Engineerin	ng case studies and performance evaluation	on					
SUGGESTED	DACTIVITIES							
• Take an the pros	a example of a classific and cons of each decis	cation problem. Draw different decision ion variable at each level of the tree	trees for the exa	mple and explain				
SUGGESTED	DEVALUATIONME	THODS						
• Using I	Regression find a rela	ation between a dependent and an ind	dependent varial	ole				
UNITIV	REINFORCEMEN	NT LEARNING AND GENETIC ALG	ORITHMS	9				
. Reinforcement Methods Genet Algorithm Gene	t Learning - Scope Co ic Algorithms - Optin etic Algorithm Compon	omponents Markov Decision Process M nization Problems and Search Spaces ents	odel-based Learn General Structure	ing Model Free e of a Genetic				
SUGGESTED	DACTIVITIES							
• Outline	10 machine learning ap	oplications in healthcare						
SUGGESTED	DEVALUATIONME	THODS						
Using I	Mean Absolute Erro	or (MAE) analyze the loss over the w	hole dataset					
UNITV	NEURAL NETWO	RKS		9				
Multilayer perc gradient descen vanishing gradie world applicatio	eptron, activation fun t, error backpropagation ent problem) – ReLU, h ons of neural networks	ctions, network training – gradient d on, from shallow networks to deep ne hyperparameter tuning, batch normalizati	escent optimizati tworks –Unit sat ion, regularization	on – stochastic uration (aka the ı, dropout – Real				
SUGGESTEL	DACTIVITIES							
• Give at	least 5 recent application	ons of CNN						
• Give 5 e	examples where sequen DEVALUATIONME	tial models are suitable.						
• [Using Mean Absolu between the actual a	ite Percentage Error (MAPE) n nd predicted value	nethod define	the difference				
TotalPeriods		1		45				
SuggestiveAss	sessmentMethods		I					
Continuous	AssessmentTest	FormativeAssessmentTest	EndSemest	terExams				
(20Marks)		(20Marks)	(60Marks)					

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						SOLV	INUA		TIES								
Cou	irseOu	itcome	s														
Upo	oncom	pletion	ofthe	course	,thest	udents	willbe	ableto	:								
CO	1 Under	stand a	nd outl	ine pro	blems f	or each	type o	f mach	ine lear	ning	(U	nderstar	nd)				
C O 2	2Design	n a Dec	ision tr	ee and	Randor	m fores	t for an	applic	ation (.	Apply)							
C O .	3Imple	ment P	robabili	istic Dis	scrimin	ative a	nd Gen	erative	algorit	hms for	an applic	cation an	d analyz	e			
he r	esults						~					(App	ly)	0			
U	4Use	a too	ol to	ımplei	nent	typical	Clus	tering	algor	ithms	tor diff	terent	types c)İ			
тррі С О :	5Design	$\frac{1}{10}$ n and in	npleme	ent an F	IMM f	or a Se	auence	Model	type o	f applica	tion and	identifv	applicat	tions suit			
for d	lifferen	t types	of Mac	hine Le	arning	with su	itable j	justifica	ation. (Underst	and)	indentify	upphou	lions sur			
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BLOOMSC ATEGORY	CAT1	CAT2	FAT1	FAT2	ENDSEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

BLOOMSLEVELASSESSMENTPATTERN

COURSELEVELASSESSMENTQUESTIONS

CourseOutcome1 (CO1):(Understand)

- 1. Explain the Vapnik-Chervonenkis dimension with suitable examples
- 2. Examine in detail about Inductive bias with a suitable sketch

CourseOutcome2 (CO2):(Apply)

- 1. Explain the process of constructing CART with a suitable example
- 2. Write short notes on (i)Regression and Correlation (ii)Limitation of Regression Model

CourseOutcome3 (CO3):(Apply)

Explain the weighted K-nearest neighbour algorithm with a suitable sketch

1. Explain about EM algorithm with suitableexamples

Course Outcome 4(CO4): (Apply)

- 1. Discuss in detail about Backpropagation Concept in ANN
- 2. Explain hyper parameter tuning with example

CourseOutcome 5(CO5):(Understand)

- 1. Mention the various methods of measuring Classifier Performance with suitable example
- 2. List and illuminate the Guidelines for Machine Learning Experiments

Prepared By

Verified By

Ms.Janet,AP/AI&DS

Dr.A.Anitha,HoD/AI&DS

24 4 12002	AI IN CYBER SECURITY L	Т	Р	С
24A13802	3	0	0	3
Preamble				
'his course introd	luces the concept of cyber security in Artificial intelligence. The students wo	uld g	gain l	nowledg
f various cyber	security terminologies, technologies, protocols, threat analysis, security	prin	ciples	s, securi
nechanisms, met	nods/practices to secure systems using artificial intelligence conepts.			
Prerequisites	orthecourse			
• NIL				
Objectives				
1. To provid	le students with a knowledge and importance of cyber security.			
2. To under	stand the various types of hackers and cyber attacks and analyze the nature	of	attacl	ks throug
cyber/co	mputer forensics software/tools.			
4 To classif	the various cybercrimes and its remedial and mitigation measures			
5. To Know	about cyber ethics and laws.			
UNITI	RELIABLE ARTIFICIAL INTELLIGENCE			0
UNIII				9
Introduction-ar	tificial intelligence in cybersecurity: AI systems' support to cybersecu	ritv.	AI n	nalicious
uses,Ethical co	onsiderations related to AI in cybersecurity, Asymmetries in the inte	rpla	y of	AI and
cybersecurity,7	rustworthy versus reliable AI, Cybersecurity risks associated with ant	hrop	omo	rphising
AI,Weaponisat	ion and the offence versus defence debate,	_		
SUGGESTED	ACTIVITIES			
Discuss	iononcyber security thinking			
• Demon	strationofconceptsusingAI in cybersecurity			
SUGGESTED	EVALUATIONMETHODS			
• Demon	strate real time artificial intelligence in cyber applications			
UNITII	CYBER SECURITY FOR ARTIFICIAL INTELLIGENCE			9
Introduction-M	achine learning systems do indeed have a larger attack surface-A high-	leve	l vie	w of the
threat landsca	pe-An AI threat model-Safety and security of open, autonomou	IS,	AI-b	ased I
infrastructure,	and its runtime evolution-Addressing the insecurity of the network as it	rela	tes t	o AI-Ar
example of a se	cure development life cycle for AI systems			
SUGGESTED	ACTIVITIES			
Discuss	ion on theuseofMachine learning systems			
	ion on the AL-based IT infrastructure			

SUGGESTEDEVALUATIONMETHODS

• Demon	strate the Machine learning systems		
• Demon	strate theAI-based IT infrastructure		
UNITIII	POLICY ISSUES AND RECOMMENDATIONS		9
Introduction-Co Existing legal for role of AI recommendation	arrent and future AI laws: accountability, auditability, and regrameworks: EU cybersecurity-Major policy issues-Develop and de standards activity and cybersecurity-Additional policy ons	ulatory enford eploy reliable issues-Over	cement- AI-The carching
SUGGESTED	ACTIVITIES		
Discuss	iononpolicy issues		
• Discuss	ion on Existing legal frameworks		
SUGGESTED	EVALUATIONMETHODS		
• Demon	stration on Additional policy issues		
UNITIV	AI AND NETWORK DIAGNOSIS		9
Introduction-A Sensing for the Internet of Thin	I Diagnosis Process-Machine LearningResult Analysis, AI Impace e Detection of Tumors, Cybersecurity Solutions and Communicangs Applications	ts on Photoni tion Technolo	c Crystal ogies for
SUGGESTED	ACTIVITIES		
 Discuss Discuss Applica 	ionand comparisonofmachine learning approach ion on Cybersecurity Solutions and Communication Technologies tions	s for Internet	of Things
SUGGESTED	EVALUATIONMETHODS		
DemonDemon	strationofmachine learning approach strationofCybersecurity Solutions		
UNITV	CYBER ATTACKS AND RISK MANAGEMENT		9
Cybersecurity- Artificial Inte Blockchain-Ba	Oriented IoT Architecture-Attacks on IoT Devices-Cybersecurit Oriented IoT Architecture-Attacks on IoT Devices-Cybersecurit Origence (AI) in Cybersecurity-Quantum-Resistant Cybersecurity Sed Cybersecurity Solutions for Industry 4.0 Applications ACTIVITIES	y Risk Mana curity Techi	igement- 10logies-
D :			
Discuss Discuss	ion on LoT Architecture		
• Discuss	EVALUATIONMETHODS		
Demon	strationofCvberattacks		
• Demon	strationofIoT Architecture		
TotalPeriods		45	
SuggestiveAss	essmentMethods		

ContinuousAssessmentTest	FormativeAssessmentTest	EndSemesterExams								
(20Marks)	(20Marks)	(60Marks)								
DESCRIPTIVEQUESTIONS	7.ASSIGNMENT	DESCRIPTIVEQ								
	8. ONLINEQUIZZES	UESTIONS								
CourseOutcomes	CourseOutcomes									
Uponcompletion of the course, thes	tudentswillbeableto:									
CO1Understand artificial intelliger	ce in cyber security .(Understand)									
CO2Apply machine learning in cyt	per security (Apply)									
CO3Apply AI laws to provide police	cy issues and recommendations.(Ap	oply)								
CO4Using AI diagnosis process co	mpare machine learning approach	(Apply)								
CO5Applycyber attacks and risk m	anagement stratergy.	(Apply)								
Text Books										
1. "Artificial intelligence and 2021.by" Lorenzo Pupillo, Sto	l cyber security"Centre for Europefano Fantin, Afonso Ferreira, Carolina	bean Policy Studies (CEPS),May a Polito"								
2. "Artificial Intellig	gence and Cybe	rsecurity, Advances and								
Innovations", by"IshaaniPri	adarshini, and Rohit Sharma" First	edition published 2022								
ReferenceBooks										
1. "Artificial Intelligence and National Security", by "by Greg Allen & Taniel Chan, 2017										
WebResources:										
1. <u>https://www.morganstanley.com/articles/ai-cybersecurity-new-era</u>										
2. <u>https://www.redhat.com/en/blog/4-use-cases-ai-cyber-security</u>										
3. <u>https://www.techmagic.co/blog/ai-in-cybersecurity</u>										

COVsPO Mapping and COVsPSO Mapping

С	PO	РО	PO	PO1	PO1	PSO	PSO	PSO						
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3	2	2	2						1		
2	3	3	3	2	2	2						1		
3	3	3	3	3	3	2				3	3	2	3	3
4	3	3	3	3	3	2				3	3	2	3	3
5	3	3	3	3	3	2				3	3	3	3	3

BLOOMSC ATEGORY	CAT1	CAT2	FAT1	FAT2	ENDSEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

BLOOMSLEVELASSESSMENTPATTERN

COURSE LEVEL ASSESSMENT QUESTIONS

Course Outcome 1 (CO1) (Understand)

1. A financial institution is facing an increase in cyber threats, and current security measures are insufficient. How would you design an AI-based cybersecurity framework to address these challenges? What steps would you take to implement and integrate AI tools, and how would you measure their impact on security?

2.A hospital uses an AI-driven system to prioritize patient care, but there's concern that rare conditions may be deprioritized. How would you ensure the AI system doesn't overlook patients with atypical symptoms? What safeguards would you implement to balance accuracy, fairness, and inclusivity in the diagnostic process?

Course Outcome 2 (CO2): (Apply)

1A company has experienced security breaches, and its current tools are outdated. How would you identify vulnerabilities in the company's infrastructure and implement stronger security measures? What strategies would you use to ensure ongoing protection against future cyber threats, including the potential use of AI-based systems?

2.A financial institution uses an AI-powered fraud detection system, but there's concern about flagging legitimate transactions or missing subtle fraud. How does the system identify fraudulent activity without causing false positives? What thresholds would you set for flagging transactions, and how would you balance minimizing false positives while detecting real fraud?

Course Outcome 3 (CO3): (Apply)

1.A government agency is developing policies for the ethical use of AI in autonomous vehicles, addressing safety, accountability, and privacy concerns. Stakeholders have differing views on regulation. What evaluation approaches would you use to assess these policy issues? How would you ensure your recommendations are evidence-based, practical, and aligned with stakeholders' needs?

2.A government regulator is overseeing the rapid deployment of AI in the financial sector for tasks like credit scoring and fraud detection. There are concerns about accuracy, transparency, and biases. How should regulators balance swift AI adoption with the risks of inadequate oversight? What measures would you take to ensure responsible and ethical implementation while promoting innovation?

Course Outcome 4 (CO4): (Apply)

1.A hospital has implemented an AI-powered diagnostic system to assist with diseases like cancer and pneumonia. Healthcare professionals are hesitant and unclear about its decision-making process and limitations. How would you explain the AI diagnosis process to them? What steps would you take to build trust and understanding of the system's functionality and limitations?

2.A company's IT security team is noticing an increase in failed login attempts, unsure if it's a brute-force attack or system configuration issues. The company uses an AI-based security system to detect potential threats. How would the AI diagnose whether the failed logins are caused by a brute-force attack or configuration issues? What factors would it consider to differentiate the two?

Course Outcome 5 (CO5): (Apply)

1.A company has deployed a large-scale IoT system in its manufacturing facilities, raising concerns about vulnerabilities such as unsecured communications and cyberattacks. How would you develop a risk management strategy for this IoT architecture? What steps would you take to identify, assess, and mitigate potential risks while ensuring system reliability and security?

2.A manufacturing company has faced a security breach in its industrial systems, compromising control over critical processes. How would you restore a secure and trusted command channel for these systems? What steps would you take to secure communication, prevent unauthorized access, and ensure system integrity?

Prepared By Mrs.Brintha,AP/AI&DS Verified By Dr.A.Anitha,HoD/AI&DS

21 & 12802	ADVANCEMENTS IN AI	L	Т	Р	С			
21A13003		3	0	0	3			
Preamble			l	1				
This course aims to provide the students with a foundation in Artificial Intelligence. The focus is todevelop the basic problem-solving skills in students, and to improve their proficiency in applying thebasic knowledge gained to solve real world scenario. This will enable the students to developapplicationsrelatedtothefield of AI.								
Prerequisitesforthecourse								
• NIL								
Objectives								
1. Tolearn	thebasicconstructsof Artificial Intelligence							
2. Tolearn	and build supervised and unsupervised models							
3. Tounde	rstand the principles of Deep neural network.							
4. To com	prehend advanced deep learning models.							
5. To deve	elop Speech Recognition System							
UNITI	INTELLIGENT AGENTS AND LOGICAL REASONING				9			
Problem Solvi Propositional L Logic- Syntax Inference- Prob SUGGESTED • Discuss • Discuss SUGGESTED	ng Agents- Heuristic Search Strategies – Local Search And Op ogic-Propositional Theorem Proving- Agents Based On Proposition And Semantics-Inferences In First Order Logic -Acting Under Dabilistic Reasoning – Bayesian Networks – Causal Networks. ACTIVITIES ionon Intelligent Agent Framework ion on probabilistic reasoning using uncertainty EVALUATIONMETHODS	ptimiz onal L Uncer	vatio ogic rtain	n Pro- Firs ty- B	ayesian			
Quizon	propositional Logic							
UNITII	GEN AI				9			
 Historical Overview of Generative modeling - Difference between Gen AI and Discriminative Modeling – Importance of generative models in AI and Machine Learning – Types of Generative models – GANs, VAEs, autoregressive models and Vector quantized Diffusion models - Understanding if probabilistic modeling and generative process - Challenges of Generative Modeling – Future of Gen AI – Ethical Aspects of AI – Responsible AI – Use Cases. SUGGESTEDACTIVITIES Discussion on GAN Comparison between Generative models 								
SUGGESTED	EVALUATIONMETHODS							

• Demor	astrationofdifference between types of ML							
UNITIII	PROMPT ENGINEERING		9					
Prompt Engin Human Feedb like hallucinat	eering – Designing Prompts– Revising Prompts using Reinforce ack (RLHF) - Retrieval Augmented Generation – Multimodal LI ion.	ement Learnin LM – Issues o	ng from of LLM					
SUGGESTEI	DACTIVITIES							
Discus	siononLLM							
Group	Group Discussion on Prompt Engineering							
SUGGESTEI	DEVALUATIONMETHODS							
Quizze	S							
 Assign 	ment on above topics							
Role p	ay on RLHF							
UNITIV	DEEP LEARNING		9					
Linear Algebr	a- Scalars -Vectors- Matrices and Tensors- Probability Distribu	tion- Gradie	nt Based					
Optimization	- Convolution Operation - Sparse Interactions- Parameter Sh	aring – Equ	ivalence-					
Pooling- Conv	olution Variants – CNN Learning – Loss Functions- Gradient Com	putations.						
SUGGESTEI	DACTIVITIES							
Discus	sionon convolution operations							
• Solvep	roblemsusing probability distribution							
SUGGESTEI	DEVALUATIONMETHODS							
Demon	nstrationon CNN learning							
Demon	istrationon Loss functions uses							
Quizze								
UNITV	TEXT AND SPEECH ANALYSIS		9					
Foundations C	of Natural Language Processing – Language Syntax And Structure -	- Text Proces	sing And					
Wrangling –	Vector Semantics And Embeddings - Glove Model- Fast Te	est Model –	RNN –					
Information F	etrieval - IR Based Question Answering - Text Normalization	n – Letter-To	Sound-					
Prosody -Othe	r Deep Learning Based TTS Systems.							
SUGGESTEI	DACTIVITIES							
Flippe	l classroom on speech signal processing							
Exploring Text normalization								
SUGGESTEI	DEVALUATIONMETHODS							
Assign	ment on above topics							
• Quizze	s on Glove model							
TotalPeriods		45						
SuggestiveAs	sessmentMethods							

ContinuousAssessmentTest	FormativeAssessmentTest	EndSemesterExams
(20Marks)	(20Marks)	(60Marks)
	1 ASSIGNMENT	
1. DESCRIPTIVEQUESTIONS		FOUESTIONS
2. CASE	2. ONLINEQUIZZES	EQCESTIONS
STUDYQUESTIONS	3 PROBLEM	2.CASE STUDY
	SOLVINGACTIVITIES	QUESTIONS
CourseOutcomes		
Uponcompletion of the course, the	studentswillbeableto:	
CO1 Learn the problem solving tec	chniques	(understand)
CO2Apply Gen AI to Generating	Texts.	(Apply)
CO3Evaluate Multimodal of LLM	•	(Apply)
CO4Apply Convolution Neural Neural	etwork for image processing	(Analyze)
CO5Analyzedeep learning models	for building speech recognition an	d text-to-speech systems (Analyze)
Text Books		
1. Stuart Russell and Peter	Norvig, "Artificial Intelligence	– A Modern Approach". Fourth
Edition. Pearson Education	. 2021.	······································
2. AltafRehmani, "Generative	AI for Evervone". BlueRose One.	2024.
3. Ian Goodfellow. YoshuaBe	engio. Aaron Courville. ``Deep Lea	rning", MIT Press, 2016.
4 Daniel Jurafsky and James	s H. Martin, "Speech and Language	ge Processing: An Introduction to
Natural Language Process	sing Computational Linguistics	and Speech Recognition" Third
Edition, 2022.	Sing, Company Linguistics,	and speech recognition , third
ReferenceBooks		
1 Den W Patterson "Introduc	ation to AL and ES" Dearson Educe	ation 2007
2 Andrew Glassner "Deen Le	earning: A Visual Approach" No S	tarch Press 2021
3. Dipanjan Sarkar, "Text Ar	alvics with Python: A Practical	Real-World approach to Gaining
Actionable insights from yo	ur data", APress,2018.	
WebResources	· · · ·	
5. <u>What Is Artificial Intelligence</u>	e (AI)? IBM	
6. <u>Generative AI</u>		
7. <u>Prompt engineering - Open</u>	<u>AI API</u>	
8. What is Deep Learning? - Deep	ep Learning AI Explained - AWS	
9. Introduction to Convolution N	Neural Network - GeeksforGeeks	m TashTaraat
10. <u>What is Natural Language</u>	Processing (NLP)? Definition from	m lechlarget

${\bf COVsPOM apping and COVsPSOM apping}$

С	PO	PO1	PO1	PSO	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3

1	3	3	3			2				1		
2	3	3	3			2				1		
3	3	3	3	3	3	2		3	3	2	3	3
4	3	3	3	3	3	2		3	3	2	3	3
5	3	3	3	3	3	2		3	3	3	3	3

BLOOMSLEVELASSESSMENTPATTERN

BLOOMSC ATEGORY	CAT1	CAT2	FAT1	FAT2	ENDSEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

COURSELEVELASSESSMENTQUESTIONS

CourseOutcome1 (CO1):(Understand)

1. How does the choice of neighborhood structure impact the efficiency of a local search algorithm in finding optimal solutions? Can you provide examples where specific neighborhood structures work better for certain problems?

2. Given a real-world optimization problem (e.g., job scheduling in manufacturing), design a local search algorithm to solve it. What factors would influence your choice of algorithm and neighborhood structure?

CourseOutcome2 (CO2):(Apply)

- 1. How has GenAI improved the quality of content creation for your team?
- 2. What measurable impact has GenAI had on audience engagement metrics (e.g., click-through rates or time spent on content)?

CourseOutcome3 (CO3):(Apply)

1. How effectively do prompts generate outputs that meet the intended goals (e.g., relevance, accuracy, or tone)?

2. Has prompt refinement reduced errors such as hallucinations or irrelevant responses?

Course Outcome 4(CO4): (Analyze)

1. How do different gradient-based optimization algorithms (e.g., SGD, Adam, RMSprop) impact convergence rates and solution quality? In what ways do these algorithms handle issues such as noisy gradients and sparse data differently?

2. Design a gradient-based optimization approach to handle a non-convex loss landscape, like those common in deep learning. What modifications could you introduce to help the optimizer escape local minima and find a globally optimal solution?

CourseOutcome 5(CO5):(Analyze)

- 1. How do different TTS models (e.g., concatenative, parametric, neural TTS) affect the quality and naturalness of generated speech? What trade-offs in terms of computational cost and flexibility arise with each approach?
- 2. Why might neural TTS systems struggle with maintaining consistency in pronunciation and prosody over longer text passages? What modifications could improve these systems' ability to produce coherent, natural-sounding speech?

Prepared By

Verified By

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Dr.A.Anitha,HoD/AI&DS

24 & 13804	DATA EXPLORATION USING PUTHON	L	Τ	Р	С
24413004	DATA EXILORATION USING FITTION	3	0	0	3

Preamble

This course introduces data exploration using Python, focusing on techniques to analyze and understand datasets. Students will learn to clean, visualize, and summarize data using libraries like Pandas and Matplotlib, gaining insights into data structure and patterns to prepare for further analysis or modeling.

Prerequisites for the course

NIL

Objectives

- 6. To outline an overview of exploratory data analysis.
- 7. To implement data visualization using Matplotlib.
- 8. To utilize various EDA tools and techniques to perform descriptive statistics, data transformation, and time series analysis.
- 9. To perform univariate and bivariate data exploration and analysis.
- 10. To use Data exploration and visualization techniques for multivariate and time series data.

UNIT I	DATA PREPARATION	9					
EDA fundamentals - Understanding data science - Significance of EDA - Making sense of data -							
Comparing EDA with classical and Bayesian analysis - Software tools for EDA - Visual Aids for							
EDA - Data transformation techniques-merging database, reshaping and pivoting, Transformation							
techniques.							

SUGGESTED ACTIVITIES:

• Provide a sample dataset (e.g., a sales or weather dataset) and ask students to perform basic EDA using Python (e.g., loading the data, checking for missing values, generating summary statistics).

SUGGESTED EVALUATION METHODS:

- Assignment problems
- Quizzes

UNIT II	DATA MANIPULATION	9						
Data Manipulatio	n using Pandas – Pandas Objects – Data Ind	exing and Selection – Operating on						
Data – Handling Missing Data – Hierarchical Indexing – Combining datasets – Concat, Append.								
Merge and Join –	Merge and Join – Aggregation and grouping – Pivot Tables – Vectorized String Operations							
SUGGESTED A	CTIVITIES:							
 Use a real-world dataset (e.g., sales data, COVID-19 data, or social media data) to apply all of the data manipulation techniques learned: 1. Clean the data (handling missing values, duplicates, etc.). 2. Perform aggregation and grouping based on relevant categories. 3. Visualize findings with pivot tables and graphs. 4. Use string operations to clean or transform categorical text data. 								
SUGGESTED E	VALUATION METHODS:							
• Assignme	nt Problem							
• Quizzes								
UNIT III D	ATA EXPLORATION	9						
Significance of E	EDA - Comparing EDA with classical and Ba	yesian analysis - Software tools for						
EDA - Visual A	ids for EDA - EDA with Personal Email -	Data Transformation - Descriptive						
Statistics - Group	ing Datasets Correlation - Time Series Analysis							
SUGGESTED A	CTIVITIES:							
• Provide tv	vo datasets—one that benefits from classical st	atistical analysis and one that can be						
better und	erstood using Bayesian methods							
SUGGESTED E	VALUATION METHODS:							
• Assignme	nt Problem							
• Quizzes								
UNIT IV U A	NIVARIATE ANALYSIS AND BIVA NALYSIS	ARIATE 9						
Introduction to Si	Introduction to Single Variable: Distribution Variables – Numerical Summaries of Level and Spread							
- Scaling and Standardizing - Inequality. Introduction to bivariate: Relationships between Two								
Variables – Percentage Tables – Analysis Contingency Tables – Handling Several Batches –								
Scatterplots and F	Scatterplots and Resistant Lines.							

SUGGESTED ACTIVITIES:

• Create a visual comparison chart outlining different GAN variants (e.g., DCGAN, StyleGAN, CycleGAN), focusing on their unique purposes and architecture differences. Each group could research one GAN type and present to the class.

SUGGESTED EVALUATION METHODS:

- Assignment Problem
- Quizzes

UNIT V	MULTIVARIATE AND TIME SERIES ANALYSIS	9
Introducing a	Third Variable - Causal Explanations - Three-Variable C	Contingency Tables and
Beyond - Fund	damentals of TSA - Chracteristics of time series data - Data	Cleaning – Time-based
indexing - Vis	ualizing – Grouping – Resampling.	

SUGGESTED ACTIVITIES:

• Introduce the characteristics of time series data using a dataset with a clear time component (e.g., stock prices or temperature data).

SUGGESTED EVALUATION METHODS:

- Assignment Problem
- Quizzes

Total Periods

Suggestive Assessment Methods

Continuous Assessment Test (30 Marks)	Continuous Assessment Test (10 Marks)	End Semester Exams (60 Marks)
1. DESC RIPTI VE QUES TION S	1.ASSIGNMENT 2. ONLINE QUIZZES 3.PROBLEM-SOLVING ACTIVITIES	1. DESCRIPTIVE QUESTIONS

45

	Course Outcomes
	Upon completion of the course, the students will be able to:
6.	Understand the fundamentals of data preparation techniques.
7.	Process and manipulate the data
8.	Perform univariate data exploration and analysis.
9.	Apply bivariate data exploration and analysis.
10.	Implement Data exploration and visualization techniques for multivariate and time series
	data.
	Text Books
1. Suresh Python", P	Kumar Mukhiya, Usman Ahmed, "Hands-On Exploratory Data Analysis with Packt Publishing, 2020. (Unit 1)
Data ". First	st Edition, O Reilly, 2017. (Unit 2)
3. Cather Scientists"	ine Mars, Jane Elliott, "Exploring Data: An Introduction to Data Analysis for Social , Wiley Publications, 2nd Edition, 2008. (Unit 3,4,5)
	Reference Books
1. Eric Pi 2017.	impler, Data Visualization and Exploration with R, GeoSpatial Training service,
2. Claus C	D. Wilke, "Fundamentals of Data Visualization", O'reilly Publications, 2019.
3. Matthe Foundation	ew O. Ward, Georges Grinstein, Daniel Keim, "Interactive Data Visualization: ns, Techniques, and Applications", 2nd Edition, CRC press, 2015.
Web Resou	ırces
• <u>http</u> • <u>http</u> • <u>http</u>	s://www.geeksforgeeks.org/exploratory-data-analysis-in-python/ ps://www.geeksforgeeks.org/univariate-bivariate-and-multivariate-data-and-its-analysis/ ps://www.tableau.com/analytics/what-is-time-series-

analysis#:~:text=Time%20series%20analysis%20helps%20organizations,go%20far%20beyon <u>d%20line%20graphs</u>.

CO Vs PO Mapping and CO Vs PSO Mapping

С	PO	PO1	PO1	PSO	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3	1	2	2			2			3	3	3

2	1	1	2	2	2		2	2		3	1	1
3	1	1			2			2			3	
4	2	1	1	1	2		3		1		2	1
5	2	1	2	2	3					3	3	3

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- Explain the purpose and importance of Exploratory Data Analysis (EDA) in the data analysis process.(Understand)
- Given a dataset with missing values, outliers, and inconsistent formatting, identify issues that would impact analysis and suggest appropriate EDA techniques to address them.(Analyze)

COURSE OUTCOME 2:

- Given a visualization showing a dataset's monthly sales data, identify any issues in the plot (e.g., missing labels or poor color choices) and suggest improvements to make the data clearer and more informative. (Analyze)
- Create a bar chart and a line plot for a sample dataset using Matplotlib. Label the axes, add a title, and ensure the chart is visually clear. Explain how these visualizations could aid in understanding the dataset. (Apply)

COURSE OUTCOME 3:

- Given a dataset with a single numerical variable, determine the most appropriate visualizations (e.g., histogram, box plot) and statistical summaries to describe its distribution. (Analyze)
- Conduct a univariate analysis on a dataset column of your choice. Generate appropriate visualizations, calculate key statistics (e.g., mean, median, mode, range, variance), and interpret what these indicate about the data. (**Apply**)

COURSE OUTCOME 4:

- Given a dataset with two numerical variables, determine whether they have a linear relationship and discuss how you would interpret a scatter plot and correlation coefficient in this context.(**Analyze**)
- Using a dataset with two numerical variables (e.g., height and weight), perform bivariate analysis by creating a scatter plot and calculating the correlation coefficient. Interpret your findings.(**Apply**)

COURSE OUTCOME 5:

- Describe the unique characteristics of multivariate and time series data and explain why specialized techniques are needed for their analysis.**Understand**)
- •

Given a time series dataset (e.g., daily temperature over a

year), identify any patterns, trends, or seasonality that can be observed through line plots and

moving averages. Describe how these patterns help in understanding time-dependent data.(Analyze)

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	C
212AI3805 DATASCIENCEESSENTIALS L I P	C
	3
Preamble	
This course encompasses to use Data exploration and visualization techniques for multivariate a series data. analysis and evaluation of data using mathematics, s and computerscience. The main goal of this course is to gather useful data for fore casting, trend analysis, produce opment, and strategic decision-making	and time tatistics, actdevel
Prerequisitesforthecourse	
• NIL	
Objectives	
1. ToIntroducetheEssentialElementsofDataScience.	
2. ToExploretheData,ProcesstheDataandInferKnowledge.	
3. To Perform Univariate Data Exploration and Analysis.	
4. To Outline an Overview of Exploratory Data Analysis.	
5. To Apply Bivariate Data Exploration and Analysis.	
UNITI INTRODUCTIONTODATASCIENCE	9
typesofdata.	
SUGGESTEDACTIVITIES	
Inclassactivityidentifyingthedataanddataresources	
Analyzetheroleofdatascientist	
SUGGESTEDEVALUATIONMETHODS	
 Assignmentproblems Ouizzes 	
UNITII DATAEXPLORATIONANDMANIPULATON	9
Vectors–Matrices–DataFrames-Indexing,Slicing,Aggregation–Broadcasting–Binning– Partitioning–k-neighboursexample–Dataselection–Handlingmissingdata– Dataloading,storageandfileformats-Combiningdatasets–Concat,Append,mergeandjoinoperations	
SUGGESTEDACTIVITIES	
Presentationanddiscussionondataexploration.	
• Implementationofdatahandling	
SUGGESTEDEVALUATIONMETHODS	
- Quizzes
- Assignment

UNITIII VISUALIZATION

VisualizationTechniques-Barchart-Linechart-Scatterplot-Histograms-Binning-DensityandContourplots-

VisualizingErrors-Errorbars-TextandAnnotation-Customizingcolours-

Geomaps..

SUGGESTEDACTIVITIES

• Performthedatavisualizationforbehaviourofhumaninonlinesocialnetworks

SUGGESTEDEVALUATIONMETHODS

- Quizzes
- Assignment on above topics

UNITIV EXPLORATORY DATA ANALYSIS

EDA fundamentals – Significance of EDA – Making sense of data – Comparing EDA with classical and Bayesian analysis – Software tools for EDA - Visual Aids- Data transformation techniques-Use cases for exploratory data analysis.

SUGGESTEDACTIVITIES

• Discussionon Data transformation Techniques

SUGGESTEDEVALUATIONMETHODS

• Quizzes

UNITV UNIVARIATE AND BIVARIATE ANALYSIS

Introduction to Single variable: Distributions and Variables - Numerical Summaries of Level and Spread - Scaling and Standardizing – Inequality - Smoothing Time Series - Relationships between Two Variables - Percentage Tables - Analyzing Contingency Tables - Handling Several Batches - Scatterplots and Resistant Lines – Transformations.

SUGGESTEDACTIVITIES

- Flipped classroom on Time Series
- Exploring Variate

SUGGESTEDEVALUATIONMETHODS

- Assignment on above topics
- Quizzes

TotalPeriods

181

45

9

9

9

ContinuousAssessmentTest	FormativeAssessmentTest	EndSemesterExams						
(20Marks)	(20Marks)	(60Marks)						
1. DESCRIPTIVE QUESTIONS 2. CASE STUDY QUESTIONS	1.ASSIGNMENT 2. ONLINEQUIZZES 3.PROBLEM-SOLVING ACTIVITIES	1. DESCRIPTIVE QUESTIONS2. CASESTUDY QUESTIONS						
CourseOutcomes								
Uponcompletion of the course, the	studentswillbeableto:							
 CO1UnderstandthebasicconceptsofDataSciencetopracticePythonfunctionalityandlibraries.(Un derstand) CO2Use linear algebra,descriptivestatisticsto represent data andto understanddistributionsof data.(Apply) CO3 Interpretthesignificanceofdatausinginferentialstatisticsandvisualizationtechniques(Apply) CO4Apply Univariate and bivariate data exploration and analysis. (Analyze) CO5Use Data exploration and visualization techniques for multivariate(Analyze) 								
Text Books								
 Joel Grus ,"Data Science fro Suresh Kumar Mukhiya, U Packt Publishing, 2020. Catherine Marsh, Jane Elli Scientists", Wiley Publication 	m Scratch",O 'Reilly Publishers, First sman Ahmed, "Hands-On Explorat ott, "Exploring Data: An Introduct ons, 2nd Edition, 2008. (Unit 3,4,5)	Edition,2015 ory Data Analysis with Python", tion to Data Analysis for Social						
ReferenceBooks								
 Eric Pimpler, Data Visualiza BrainGodsey,"Datascientist-T step",ManningPublicationsCo 	ntion and Exploration with R, GeoSp Facklethe p,Firstedition,2017	batial Training service, 2017. datascienceprocessstep-by						
WebResources 1. https://onlinecourses 2. https://towardsdatasc	.nptel.ac.in/noc22_cs74/preview_							

COVsPO Mapping and COVsPSO Mapping

С	PO	PO1	PSO	PSO	PSO									
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3

1	3	3	3	2			1	
2	3	3	3	2			1	
3	3	3	3	2			2	
4	3	3	3	2			2	
5	3	3	3	2			3	

BLOOMSLEVELASSESSMENTPATTERN

BLOOMSC ATEGORY	CAT1	CAT2	FAT1	FAT2	ENDSEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

COURSELEVELASSESSMENTQUESTIONS

CourseOutcome1 (CO1):(Understand)

- 2. GiventhenamesandgradesforeachstudentinaPhysicsclassofstudents,storetheminanestedlistand printthename(s)ofanystudent(s)havingthesecondlowestgrade.(Apply)
- **3.** Findthevalueofh(231,8)forthefunctionbelow?defh(m,n):ans=0while(m>=n):(ans,m) =(ans+1,m-n)return(ans)(Apply)

CourseOutcome2 (CO2):(Apply)

1.Inaclassof50,000studentswhatistheprobabilitythatmorethan5050studentsgetgra desDorworse (DorF)(approximately)(Analyze)

CourseOutcome3 (CO3):(Apply)

1. Drawbarchartandboxplotforanumericaldatasetandinfertheresultsofvisualizationusingvari ousvisualizationTechniques. (Analyze)

Course Outcome 4(CO4): (Analyze)

Comparing EDA with classical and Bayesian analysis.

Exploratory Data Analysis (EDA) focuses on summarizing data visually to uncover patterns, trends, and anomalies without assuming specific models or distributions. In

contrast, classical statistical analysis relies on fixed, often predefined models to make inferences, usually involving hypothesis testing with p-values. Bayesian analysis, meanwhile, updates beliefs about parameters as data is collected, incorporating prior knowledge to produce probabilistic interpretations. EDA provides flexibility, guiding model selection for further analysis. Classical methods offer structured, widely accepted inference tools, while Bayesian approaches deliver a more nuanced, probabilistic framework. Together, these methods create a comprehensive toolkit for robust data insights.

CourseOutcome 5(CO5):(Analyze)

Analyzing Contingency Tables

Analysing contingency tables, or cross-tabulation tables, helps in understanding the relationship between categorical variables. Each cell in a contingency table shows the frequency (or count) of occurrences for specific combinations of variable levels, allowing for the examination of association patterns. Common statistical methods for analysing contingency tables include:

1. Chi-square Test of Independence: Assesses whether there is a significant association between the variables by comparing observed and expected frequencies.

2. Fisher's Exact Test: Used for smaller tables, typically 2x2, providing an exact p-value when sample sizes are small.

3. Measures of Association: Includes metrics like Cramér's V, Phi coefficient, or odds ratio, to quantify the strength of association.

4. Log-linear Models: Useful for larger tables, these models explore multi-way associations among variables.

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OPEN ELECTIVE-II

OPEN	OPEN ELECTIVE-II										
1	24AI4801	Principles of Deep Learning	4	3	0	0	3				
2	24AI4802	AI and Robotics	4	3	0	0	3				
3	24AI4803	Time series Forecasting	4	3	0	0	3				
4	24AI4804	Generative AI	4	3	0	0	3				
5	24AI4805	Front end Development with AI frameworks	4	3	0	0	3				

24AI4801	PRINCIPLES OF DEEP LEARNING	L	Т	Р	С
		3	0	0	3
Preamble					

This course provides a comprehensive introduction to the foundational principles of Deep Learning, focusing on the structure, behavior, and training of neural networks. It covers the basic architecture and operation of neural networks, emphasizing their role in pattern recognition and data-driven decision-making across various domains. By the end of the course, students will be equipped to recognize patterns in real-world datasets, utilizing deep learning methodologies through practical implementation with standard API calls.

Prerequisitesforthecourse

• NIL

Objectives

UNITI

- 1. Understand the basic concepts of deep learning, including the structure and function of biological neurons and their computational counterparts.
- 2. To implement encoder-decoder sequence-to-sequence architectures for tasks like machine translation.
- 3. To learn the concepts of convolutional neural networks
- 4. To learn the structure and purpose of undercomplete and regularized autoencoders and evaluate their representational capabilities.
- To learn the large-scale deep learning applications across domains such as computer vision, 5. speech recognition, natural language processing, and other emerging areas.

DEEP NEURAL NETWORKS

Introduction to Deep Learning: Basics: Biological Neuron, Idea of computational units- Baye's rule-Learning Algorithms-Deep FeedForward Networks-Gradient based Learning- The challenges with Gradient Descent-Back Propogation-Convolution Neural networks- Variants of the Basic Convolution Function -Recurrent Neural Network-Bidirectional RNNs, Deep Recurrent Networks-Recursive Neural Networks.

SUGGESTEDACTIVITIES

- Demonstration of Recurrent Neural Network •
- Implementation of Convolution Neural networks

SUGGESTEDEVALUATIONMETHODS

- Online Quiz
- Assignment Methods

UNITH	SFOLIENCE MODELING OF RECURRENT AND RECURSIVE NETS	0
	SEQUENCE MODELING OF RECORRENT AND RECORDINE NETS	,
IInfalding Com	mutational Chamba Desumant Naural Networks, Didinational DNNs, Encoder	Deceden
Uniolaing Con	iputational Graphs, Recurrent Neural Networks, Bidirectional KINNS, Encoder-	Decoder
υ		
Sequence to Se	Architectures Deen Deeument Networks Deeurgive Neural Networks	
Sequence-10-St	Sublice Architectures. Deep Recurrent Networks. Recursive Neural Networks	•

Leaky Units, LSTM – Engineering applications of LSTM

9

SUGGESTEDACTIVITIES

- Demonstrateof Recurrent Neural Networks
- Discussion about the Deep Recurrent Networks

SUGGESTEDEVALUATIONMETHODS

- Online Quiz
- Assignment Methods

UNITIII CONVOLUTIONAL NETWORK OPERATION

9

The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuroscientific Basis for Convolutional Networks, Dataset Augmentation, Image Captioning.

SUGGESTEDACTIVITIES

- Demonstration of CNN Algorithms
- Implementation of Convolutional Neural Networks

SUGGESTEDEVALUATIONMETHODS

- Online Quiz
- Assignment Methods

UNITIV GENERATIVE MODELS AND AUTO ENCODERS

9

Directed Generative Nets - Variable Autoencoders, Generative adversarial networks, Representation Learning-UndercompleteAutoencoders, Regularized Autoencoders, Representational Power, Layer Size and Depth Stochastic Encoders and Decoders, DenoisingAutoencoders, Applications of Autoencoders.

SUGGESTEDACTIVITIES

- Discussionabout the Generative Models
- Learning the algorithms of Auto encoders

SUGGESTEDEVALUATIONMETHODS

- Online Quiz
- Assignment Methods

UNITV	MODEL EVALUATION AND APPLICATIONS
-------	-----------------------------------

9

Performance Metrics, Default Baseline Models, Determining Whether to Gather More Data, Selecting Hyperparameters, Debugging Strategies, Case study: Multi-Digit Number Recognition. Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications.

SUGGESTEDACTIVITIES

 Assignmentmodes of hyper Discussion on types 	parametes in deep learning model	
DiscussionontypesApplication	ions ETHODS	
	ETHODS	
Online Quiz		
Assignment Methods		
TotalPeriods		45
SuggestiveAssessmentMethods		
ContinuousAssessmentTest	FormativeAssessmentTest	EndSemesterExams
(20Marks)	(20Marks)	(60Marks)
5. DESCRIPTIVE QUESTIONS	9.ASSIGNMENT	5.DESCRIPTIVE
2.PROBLEM SOLVING	10. ONLINEQUIZZES	QUESTIONS
QUESTIONS	11 PROBLEM	6. PROBLEM
	SOLVING ACTIVITIES	SOLVING
		QUESTIONS
CourseOutcomes	1	I
Uponcompletion of the course, thes	tudentswillbeableto:	
CO1: Understand the basics concepts CO2: Emphasizing knowledge on Fee CO3: Understanding of CNN to mode CO4: Apply RNN Model and Deep ge CO5: Analyze the various challe applications.(Analyze))	d Forward Networks. (Understand) I for real world applications. (Understa enerative Models for various applicatio nges involved in designing deep	nd) ns.(Apply) learning algorithms for varied
Text Books		
1. Daniel A.Roberts, "Principles	s of Deep Learning", 30 June,2022	
2. Ian Goodfellow, YoshuaBeng	io, Aaron Courville, "Deep Learning",	MIT Press, 2016.
ReferenceBooks		
 Josh Patterson and Adam Gi Media, First Edition, 2017. Fundamentals of Deep Learn algorithms, Nikhil Buduma, 	bson, "Deep learning: A practitioner's ning, Designing next-generation mach O'Reilly, Shroff Publishers, 2019.	s approach", O'Reilly
WebResources		
 https://www.deeplearning.ai/c https://www.udacity.com/co https://www.edx.org/learn/d https://deeplearningcourses.com/com/com/com/com/com/com/com/com/com/	ourses/ urse/intro-to-tensorflow-for-deep-lea eep-learning om/	rningud187

COVsPOMappingandCOVsPSOMapping

С	PO	PO1	PSO	PSO	PSO									
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3			1						1		
2	3	3	3			1						1		
3	3	3	3			1						2		
4	3	3	3			1						2		
5	3	3	3			1						3		

BLOOMSLEVELASSESSMENTPATTERN

BLOOMSC ATEGORY	CAT1	CAT2	FAT1	FAT2	ENDSEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

COURSELEVELASSESSMENTQUESTIONS

Course Outcome 1 (CO1): (Understand)

1. Understand deep learning, regularization techniques, and optimization methods, enabling them to design and train effective deep learning models

- 2. State the Bayes rule.
- 3. Develop a Deep Feed forward network and explain
- 4. Assess the following with respect to deep learning examples.
- i) Random Variables. ii) Probability.

Course Outcome 2 (CO2): (Apply)

- 1. Describe various sequence modeling techniques.
- 2. Develop a Deep Feed forward network and explain.
- 3. Justify the importance of Rectified linear units in Hidden units.
- 4. Consider the Following diagram



Calculate the output for every neuron from the input layer, to the hidden layers, to the output layer and also Calculate the error in the outputs.

7. Explain sigmoid units for Bernoulli Output Distributions.

8. Justify the importance of Rectified linear units in Hidden units.

Course Outcome 3 (CO3): (Understand)

1. Explain the architecture of Convolutional Neural Networks (CNN)?

2. Explain optimizers. Why optimizers are required?

3. Show three basic strategies for obtaining convolution kernels without supervised training.

4. Differentiate locally connected layers, tiled convolution and standard convolution with suitable diagram.

5. Construct a Convolutional network to demonstrate the effect of zero padding on network . size.Explain Neuro scientific basis for Convolutional Networks.

6. Evaluate variants of the basic convolution function

Course Outcome 4 (CO4): (Apply)

- 1. Compute the gradient in a Recurrent Neural Network.
- 2. Discuss Recurrent Neural Networks in detail..
- 3. Explain how to compute the gradient in a Recurrent Neural Network.
- 4. Prepare an example of Encoder- Decoder or sequence-to-sequence RNN architecture.
- 5. Explain a modeling sequences Conditioned on Context with RNNs

Course Outcome 5 (CO5): (Analyze)

1. Describe the following. i, Independent Component Analysis, ii, Slow Feature Analysis

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2. Perform the various applications using Deep neural networks.

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24AI4802	AI AND ROBOTICS	L	Т	Р	С				
		3	0	0	3				
Preamble									
This course p	rovides a comprehensive introduction to the principles and a	oplica	tions	of ar	tificial				
intelligence (AI) in robotics. Students will explore the fundamentals of robotics systems, sensing and									
perception, pathfinding, machine learning, and human-robot interaction. Through a combination of									
lectures, assignments, and projects, students will gain hands-on experience with designing and developing									
intelligent robo	tic systems.								
Prerequisites f	or the course								
• NIL									
Objectives									
1. To Unc	lerstand the history and evolution of robotics and AI.								
2. To Design and develop robotics systems integrating sensors, actuators, and controllers.									
3. To App	ly key AI concepts, including perception, planning, and learning.								
4. To Impl	ement pathfinding algorithms and localization techniques.								
5. To Deve	elop machine learning models for object recognition and classification	on.							
UNIT I	ROBOTIC PARADIGMS			9					
Overview of R	obotics Systems - Sensors - Actuators - Controllers - Key AI C	Concep	ots for	Robo	otics –				
Perception – P	lanning – Learning - The Seven Areas of AI - Hierarchical Parac	ligm -	• Attri	butes	of the				
Hierarchical Pa	radigm.								
SUGGESTED	ACTIVITIES								
• Demo	onstrate the Hierarchical Paradigm and the primitives								
SUGGESTED	EVALUATION METHODS								
Assignment	nent								
UNIT II	SENSING, PERCEPTION AND ACTIONS			9					
Steps in Design	ing a Reactive Behavioral System - Logical sensors - Behavioral Se	nsor F	Fusion	- Des	igning				
a Sensor Suite -	Proprioceptive Sensors - Proximity Sensors - Computer Vision - Ra	ange fi	rom V	ision.					
SUGGESTED	ACTIVITIES								
• Demons	strate the components of a robotics paradigm								

SUGGESTED	EVALUATION METHODS							
BUUUEBIED								
Quizzes	3							
UNIT IIIPATHFINDING AND OPTIMIZATION9								
Topological Pa	th Planning: Relational Methods, Associative Methods - Metric I	Path Plannir	ng: Cspace					
Representation	s, Graph Based Planners, Wavefront Based Planners, Interleavin	ng Path Pla	nning and					
Reactive Execu	tion-Localization and Map Making: Bayesian, Dempster-Shafer The	ory, HIMM						
SUGGESTED	ACTIVITIES							
List and	l discuss the Topological and metric path planning							
SUGGESTED	EVALUATION METHODS							
Puzzle								
UNIT IV	MACHINE LEARNING IN ROBOTICS		9					
Regression and	l Classification - Neural Networks for Robotics Control - Decisi	ion Trees a	nd Random					
Forests for Ro	botics - Clustering and Dimensionality Reduction - Principal Con	mponent Ar	nalysis - Q-					
Learning and S	ARSA for Robotics Control - Deep Q-Networks							
SUGGESTED	ACTIVITIES							
• Illustrat	e the Image recognition process and artificial neurons							
SUGGESTED	EVALUATION METHODS							
Assignment	nent							
UNIT V	HUMAN-ROBOT INTERACTION		9					
Multi-Robot C	ommunication Protocols - Formation Control and Synchronization	- Collision	Avoidance					
and Navigation	- Distributed Sensing and Perception - Human-Robot Communic	cation Metho	ods - Robot					
Gesture and Fa	cial Recognition - Trust and Reliability - User Interface Design for H	ÍRI						
SUGGESTED	ACTIVITIES							
Demon	strate to setting up the robot							
SUGGESTED	EVALUATION METHODS							
Project								
Total Periods	Total Periods 45							
Suggestive Ass	sessment Methods							

Francis Xavier Engineering College/ Dept of AI& DS/R2024/Curriculum and Syllabi/VIII Board of Studies

Continuous Assessment Test	Formative Assessment Test	End Semester Exams			
(20 Marks)	(20 Marks)	(60 Marks)			
1. DESCRIPTIVE QUESTIONS	1.ASSIGNMENT	1.DESCRIPTIVE QUESTIONS			
2. PROBLEM SOLVING	2. ONLINE QUIZZES	2.PROBLEM SOLVING			
QUESTIONS	3.PROBLEM-SOLVING	QUESTIONS			
	ACTIVITIES				

Course Outcomes

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

CO1 Remember and understand key concepts in robotics and AI.

CO2 Apply concepts to solve problems and design robotics systems.

CO3 Analyze and compare different approaches, algorithms, and techniques.

CO4 Design and implement innovative robotics systems.

CO5 Evaluate the effectiveness and performance of robotics systems

Text Books

1. Artificial Intelligence for Robotics - Second Editionby Francis X. Govers III Released March 2024

2. Introduction to AI Robotics, second edition by Robin R. Murphy Released 2019

Reference Books

1.Albus, J., and Proctor, F.G., "A Reference Model Architecture for Intelligent Hybrid Control Systems," proceedings of the *International Federation of Automatic Control*, San Francisco, CA, June 30–July 5, 1996.

2. Allocca, J. A., and Stuart, A., Transducers: Theory and Application, Prentice-Hall, 1984.

Web Resources

- 1. https://www.javatpoint.com/robotics-and-artificial-intelligence
- 2. https://data-flair.training/blogs/ai-robot/
- 3. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.htm
- 4. https://builtin.com/artificial-intelligence/robotics-ai-companies
- 5. https://www.intel.com/content/www/us/en/robotics/artificial-intelligence-robotics.html

С	PO	PO1	PO1	PSO	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3			2						1		
2	3	3	3			2						1		
3	3	3	3	2	2	2				2	2	2	3	3
4	3	3	3	2	2	2				2	2	2	3	3
5	3	3	3	2	2	2				2	2	3	3	3

CO Vs PO Mapping and CO Vs PSO Mapping

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

Course Outcome 1 (CO1): (Apply)

- 1. A drone is assigned to inspect a wind turbine. What control strategies would you employ to ensure the drone maintains stability and precise positioning in variable wind conditions?
- 2. An agricultural robot is deployed to identify and pick ripe fruits from plants. How would you train the robot to accurately identify ripe fruits across different fruit types?

Course Outcome 2 (CO2): (Apply)

- 1. Apply computer vision algorithms for object recognition.
- 2. Develop a robotic system integrating sensing, perception, and action.

Course Outcome 3 (CO3): (Apply)

- 1. Integrate path planning with reactive execution.
- 2. Develop a localization and map-making algorithm using Bayesian or Dempster-Shafer theory.

Course Outcome 4 (CO4): (Apply)

- 1. Design an image recognition process using artificial neurons.
- 2. Compare features of real and artificial neurons.

Course Outcome 5 (CO5): (Apply)

- 1. Apply subsumption architecture for multi-robot system control.
- 2. Design a multi-robot system for collaborative tasks.

Prepared By

Verified By

Mrs.Angel,AP/AI&DS

Dr.A.Anitha,HoD/AI&DS

24AI4803	TIME SERIES FORECASTING	L	Т	Р	С
		3	0	0	3
Preamble				1	
This course intro ime series foreca	duces the concept of Time series in forecasting. The students would ga sting terminologies, time series models, multivariate time series and forec	in kr castir	iowl ig te	edge chniq	of variou ues.
Prerequisitesf	orthecourse				
• NIL					
Objectives					
 To provide To under To learn To classi To Know 	stand the various types of forecasting models and analyze forecasting pro- about ARMA models and spectral analysis. fy Nonstationary and Seasonal Time Series Models.	cesse	s.		
UNITI	TIME SERIES PROCESS				9
SUGGESTED	ACTIVITIES siononExamples of Time Series		>		
• Discuss	sionofTesting the Estimated Noise Sequence				
SUGGESTED	EVALUATIONMETHODS				
• Demon	strate real time examples of Time series in forecasting.				
UNITII	ARMA MODELS AND FORECASTING				9
ARMA(p , c Processes-Spec an ARMA Pro	Processes-The ACF and PACF of an ARMA(p , q) Process extral Densities-The Periodogram-Time-Invariant Linear Filters-The process-Modeling and Forecasting with ARMA Processes. Case S	s-Foi e Sp tudie	reca ectr es: (sting al De Clima	ARMA ensity of ate Data
Analysis.					
Analysis. SUGGESTED	ACTIVITIES				
Analysis. SUGGESTED • Discuss • Discuss	ACTIVITIES sion on the valuation of ARMA models. sion on the Modeling and Forecasting with ARMA Processes.				
Analysis. SUGGESTED Discuss SUGGESTED	ACTIVITIES sion on theevaluation of ARMA models. sion on theModeling and Forecasting with ARMA Processes.				

Demonstrate the evaluation of ARMA models. • Demonstrate on the Modeling and Forecasting with ARMA Processes. • NONSTATIONARY MODELS **UNITIII** 9 ARIMA Models for Nonstationary Time Series-Identification Techniques-Unit Roots in Time Series Models-Forecasting ARIMA Models-Seasonal ARIMA Models-Regression with ARMA Errors-GARCH Models-. Modified GARCH Processes-Stochastic Volatility Models-Continuous-Time Models-. An Introduction to Option Pricing. Case studies: StockMarket Trends SUGGESTEDACTIVITIES DiscussiononNonstationary. Discussion on Seasonal Time Series Models ٠ **SUGGESTEDEVALUATIONMETHODS** Demonstration on Nonstationary. Demonstration on Seasonal Time Series Models **UNITIV** MULTIVARIATE TIME SERIES 9 Second-Order Properties of Multivariate Time Series-Estimation of the Mean and Covariance Function-Multivariate ARMA Processes-Best Linear Predictors of Second-Order Random Vectors-Modeling and Forecasting with Multivariate AR Processes-Cointegration-.The ARAR Algorithm-.The Holt-Winters Algorithm-The Holt-Winters Seasonal Algorithm-. Choosing a Forecasting Algorithm. Case Studies: Retail Demand Forecasting. SUGGESTEDACTIVITIES Discussionand comparison Multivariate Time Series. **Discussion on Forecasting Techniques** SUGGESTEDEVALUATIONMETHODS Demonstration of Multivariate Time Series. Demonstration on Forecasting Techniques • **UNITV STATE-SPACE MODELS** 9 State-Space Representations-The Basic Structural Model-State-Space Representation of ARIMA Models-The Kalman Recursions-Estimation for State-Space Model-State-Space Models with Missing Observations-The EM Algorithm-Generalized State-Space Models. Case Studies:Environmental Monitoring **SUGGESTEDACTIVITIES** Discussionon State-Space Models. • Discussion on EM Algorithm. **SUGGESTEDEVALUATIONMETHODS** DemonstrationofState-Space Models. Demonstrationon EM Algorithm. • TotalPeriods 45

SuggestiveAssessmentMethods								
ContinuousAssessmentTest	FormativeAssessmentTest	EndSemesterExams						
(20Marks)	(20Marks)	(60Marks)						
DESCRIPTIVEQUESTIONS	12. ASSIGNMENT	DESCRIPTIVEQ						
	13. ONLINEQUIZZES	UESTIONS						
CourseOutcomes								
Uponcompletion of the course, thes	tudentswillbeableto:							
CO1Understand Time series in forec	asting.(Understand)							
CO2Apply ARMAModelsand Spec	tralAnalysis							
		(Apply)						
CO3Apply Nonstationary and Seas	onal Time Series Models. (Apply)							
CO4Apply Multivariate Time Serie	s and Forecasting Techniques. (Appl	y)						
CO5ApplyState-Space Models.(Ap	ply)							
Text Books								
 "Introduction to Time Series and Forecasting" by "Peter J. Brockwell • Richard A. Davis" "Third Edition",2016. 								
ReferenceBooks								
1. "THE ANALYSIS OF T	IME SERIES AN INTRODUCTI	ON",Fifth edition",BY "Chris						
Chatfield Reader in Statistics	The University of Bath United King	dom"2016						
WebResources								
1. <u>https://www.influxdata.com/ti</u>	<u>me-series-forecasting-methods/</u>							
2. <u>https://www.analyticsvidhya.com/blog/2021/07/time-series-forecasting-complete-tutorial-part-1</u>								

3. <u>https://preset.io/blog/time-series-forecasting-a-complete-guide/</u>

COVsPOMappingandCOVsPSOMapping

С	PO	PO1	PSO	PSO	PSO									
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3			2						1		
2	3	3	3	3	3	2						1		
3	3	3	3	3	3	2				3	3	2	3	3
4	3	3	3	3	3	2				3	3	2	3	3
5	3	3	3	3	3	2				3	3	3	3	3

BLOOMSLEVELASSESSMENTPATTERN

BLOOMSC ATEGORY	CAT1	CAT2	FAT1	FAT2	ENDSEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

COURSELEVELASSESSMENTQUESTIONS

COURSE LEVEL ASSESSMENT QUESTIONS

Course Outcome 1 (CO1) (Understand)

- 1. Why do we need Time series in forecasting?
- 2. Give some real-world applications of Time series in forecasting.

Course Outcome 2 (CO2): (Apply)

- 1. How is does ARMA Models works?
- 2. How would you handle Spectral Analysis?

Course Outcome 3 (CO3): (Understand)

- 1. How do you handleNonstationary models?
- 2. What evaluation approaches would you work to provide in Seasonal Time Series Models?

Course Outcome 4 (CO4): (Understand)

- 1. How do you compare MultivariateTime Series?
- 2. How do you understand time series Forecasting Techniques?

Course Outcome 5 (CO5): (Apply)

- 1. What is the problem you plan to solve Estimation for State-Space models?
- 2. How do you represent ARIMA models?

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Mrs.Brintha, AP/AI&DS

Dr.A.Anitha,HoD/AI&DS

24 & 14804	NERATIVE AI	L	Т	Р	С
24414004	UENERATIVE AI	3	0	0	3

Preamble

This course covers the principles and applications of generative AI, focusing on how machine learning models create new content from existing data. The goal is to understand its capabilities in content creation, automation, and its ethical implications.

Prerequisites for the course

NIL

Objectives

- 1. To understand the basics of Generative AI.
- 2. To acquire the basic knowledge of Text Generation.
- 3. To understand the process of generating videos.
- 4. To acquire knowledge about GAN and its variants.
- 5. To understand and Apply Gen AI tools.

UNIT I GENERATIVE AI MODELLING

9

Historical Overview of Generative modeling - Difference between Gen AI and Discriminative Modeling – Importance of generative models in AI and Machine Learning – Types of Generative models – GANs, VAEs, autoregressive models and Vector quantized Diffusion models - Understanding if probabilistic modeling and generative process - Challenges of Generative Modeling – Future of Gen AI – Ethical Aspects of AI – Responsible AI – Use Cases.

SUGGESTED ACTIVITIES:

• Match definitions with model types (GANs, VAEs, etc.) in a quick quiz or flashcard activity. This helps solidify an understanding of different generative model types.

SUGGESTED EVALUATION METHODS:

- Assignment problems
- Quizzes

TEXT GENERATION MODELS

9

Language Models Basics – Building blocks of Language models - Transformer Architecture – Encoder and Decoder – Attention mechanisms - Generation of Text – Models like BERT and GPT models – Generation of Text - Autoencoding – Regression Models – Exploring ChatGPT – Prompt Engineering – Designing Prompts– Revising Prompts using Reinforcement Learning from Human Feedback (RLHF) - Retrieval Augmented Generation – Multimodal LLM – Issues of LLM like hallucination.

SUGGESTED ACTIVITIES:

• Implement regression models for text data, like using sentiment scores, and examine how regression analysis supports text-based predictions.

SUGGESTED EVALUATION METHODS:

- Assignment Problem
- Quizzes

UNIT III GENERATIVE ADVERSARIAL NETWORKS
--

Introduction to Generative Adversarial Networks – Adversarial Training Process – Nash Equilibrium – VariationalAutoencoders – Encoder-Decoder Architectures - Stable Diffusion Models – Introduction to Transformer-based Image Generation – CLIP – Visual Transformers ViT- Dall-E2 and Dall-E3, GPT-4V.

SUGGESTED ACTIVITIES:

• Implement a basic GAN model on a small dataset, such as handwritten digits (e.g., MNIST). Students can tune hyperparameters and observe how the generated images evolve.

SUGGESTED EVALUATION METHODS:

- Assignment Problem
- Quizzes

UNIT IV GENERATION OF PAINTING AND MUSIC

9

9

Variants of GAN – Types of GAN - Cyclic GAN – Using Cyclic GAN to Generate Paintings – Neural Style Transfer – Style Transfer - Music Generating RNN – MuseGAN – Autonomous agents – Deep Q Algorithm – Actor-critic Network.

SUGGESTED ACTIVITIES:

• Create a visual comparison chart outlining different GAN variants (e.g., DCGAN, StyleGAN, CycleGAN), focusing on their unique purposes and architecture differences. Each group could research one GAN type and present to the class.

SUGGESTED	EVALUATIO	N METHODS:							
• Assignm	ent Problem								
• Quizzes									
UNIT V	OPEN SOURCE MODELS AND FRAMEWORKS 9								
Training and Fi	Training and Fine tuning of Generative models – GPT4All - Transfer learning and Pretrained models -								
Training vision	models – Goog	gle Copilot - Programming LLM -	- LangChain – Op	en Source Models – Llama					
- Programming for TimeSformer – Deployment – Hugging Face.									
SUGGESTED .	ACTIVITIES	:							
• Provide	students with a	small dataset and guide them the	rough fine-tuning	a simple generative model					
(e.g., a te	ext generator) o	on this data using a framework like	e Hugging Face's	Transformers library.					
(8-,			868						
SUGGESTED	EVALUATIO	N METHODS:							
• Assignm	ent Problem								
• Quizzes									
Total Periods				45					
Suggestive Asse	essment Metho	ods							
		Continuous Assessment Test							
Continuous Test	Assessment	(10 Marks)	End Semester I	Exams					
(30 Marks)			(60 Marks)						
(· · · · ·)									
I. DES	CR	1.ASSIGNMENT	1	DESCRIPTIVE					
IPT]		2. ONLINE QUIZZES	QUE	CSTIONS					
ION	S	3.PROBLEM-SOLVING							
		ACTIVITIES							
Cou	rse Outcomes								
Upo	n completion of	of the course, the students will b	e able to:						
1. Com	prehend the co	ncepts of Generative Modeling.							
2. Appl	y Gen AI to G	enerating Texts.							
3. Anal	yze and evalua	te the quality of generated images	using metrics and	visual assessment.					
4. Evalu	uate the impact	of generative models on artistic a	nd musical compo	ositions.					
5. Appl	y Open Source	Tools for solving problems using	Gen AI.						
Text	Text Books								

1. Denis Rothman, "Transformers for Natural Language Processing and Computer Vision", Third Edition, Packt Books, 2024.

Reference Books

- 1. David Foster, "Generative Deep Learning", O'Reily Books, 2024.
- 2. AltafRehmani, "Generative AI for Everyone", BlueRose One, 2024.

Web Resources

https://www.techtarget.com/searchenterpriseai/definition/generative-AI

https://medium.com/@ruslanmv/generative-ai-for-text-generation-from-scratch-25db8d6cd335

CO Vs PO Mapping and CO Vs PSO Mapping

С	PO	РО	PO	PO1	PO1	PSO	PSO	PSO						
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3	1	2	2		1	2			3	3	3
2	1	1	2	2	2				2	2		3	1	1
3	1	1			2			2		2			3	
4	2	1	1	1	2				3		1		2	1
5	2	1	2	2	3							3	3	3

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- Explain the key difference between generative and discriminative models. (Understand)
- Compare and contrast different generative AI models (e.g., GANs, VAEs, transformers) in terms of their underlying technological principles and use cases. (Analyze)

COURSE OUTCOME 2:

• Compare the strengths and limitations of autoregressive models (e.g., GPT) vs. autoencoder models (e.g., BERT) in text generation tasks. (Analyze)

• Design a prompt to generate a coherent story with an opensource text generation model, then explain how to improve the prompt to achieve better quality. (Apply)

COURSE OUTCOME 3:

- Evaluate why models like TimeSformer are more effective for video generation compared to traditional image-based generative models. (Analyze)
- Design a simple video generation workflow using an existing video dataset (e.g., sports actions), specifying the model and any preprocessing steps.(**Apply**)

COURSE OUTCOME 4:

- Compare the performance of CycleGAN vs. StyleGAN for a hypothetical task of converting images of paintings into realistic photographs. (Analyze)
- Modify a pretrainedStyleGAN model to generate new image outputs by changing parameters such as style or noise, then analyze how these changes impact the generated images. (**Apply**)

COURSE OUTCOME 5:

- Explain the role of transfer learning in generative AI tools and provide an example of when it would be beneficial.(**Understand**)
- Evaluate how tools like Hugging Face or Google Copilot assist in implementing generative AI models by analyzing their features and support. (Analyze)

Prepared By Ms.Kavitha,AP/AI&DS Verified By Dr.A.Anitha,HoD/AI&DS

24 A 14805	FRONT END	DEVELOPMENT	WITH	AI	L	Т	Р	С
24A14003	FRAMEWORK				3	0	0	3
Preamble							I	
This course a	ims to provide invalu	able knowledge, it is th	he hands-on	applicati	on ai	nd in	itegra	tion of AI
tools and tech	hniques that can truly	accelerate your learnin	ig and prod	uctivity.	By co	ombi	ning	traditional
workflows at	nd create cutting-edge	user interfaces that are r	s call elev	tional but	also	ng s sma	rt and	opunize Ladantive
worknows, a	la create cating cage	user interfaces that are i	lot only func		<i>u</i> 150	Sille	it and	i uduptive.
Prerequisites	sforthecourse							
• Nil								
Objectives								
1. To em	power front-end devel	opement with the know	ledge and pr	actical sk	ills.			
2. To eq	uip students with the	skills to build intelligen	t, interactive	e web app	olicat	ions	that l	everage A
tools a	and models.							
3. To op	timize AI models for p	performance and efficien	cy in a front	-end cont	ext.			
4. Use Ja the bro	avaScript-based AI lib owser.	raries to develop and tra	ain custom 1	nachine l	earni	ng m	odels	directly i
5. To bu	ild interactive web app	plications that leverage	AI to enhan	ce user ex	cperie	ence,	pers	onalizatior
and de	ecision-making.							
UNITI	WEB DEVELOPN	IENT AND AI						9
Introductionto	Front End Developme	ent-Web Development:	HTML CS	S. JavaS	crint-	Intro	oduct	ion to AI:
Definition-The	Role of AI in Moder	rn Frontend Developme	nt-AI Conce	epts for D)evelo	opers	s:Sup	ervised vs.
Unsupervised	Learning,Neural Netw	orks and Deep Learnin	g-The Evol	ution of A	AI in	Weł	o Dev	elopment-
Overview of A	I Libraries and Tools.							
SUGGESTE	DACTIVITIES							
• Discus	ssiononFront End Dev	elopment Basic						
• Discus	ss the role of AI in we	b development						
Build	a Basic Web Page							
SUGGESTE	DEVALUATIONME	THODS						
• Create	e a dynamic web app	(e.g., to-do list or weat	ther app) us	ing one o	of the	fra	newo	orks (Reac
Vue, o	or Angular)							
Provic	le a simple dataset	and ask students to in	plement a	machine	lear	ning	mod	lel using
algori	thm (e.g. clustering)	m (e.g., nnear regressio	n, classifica	uion) and	an u	nsup	bervis	ed learning
UNITII	AI-POWERED US	SER INTERACTION						9
AL Driven Dec	ign and III/IIV AL in	Web Design Tools (a a	Figma Ac	lobe Sana	ei) C	anar	ative	Design: A
Creating III	Elements- Conversation	onal III and Chathots.	, Figilia, At - Building	AI-Powe	red (That	hots	with NI P
Integrating AI	into Forms and User	Input Validation- Speed	h Recogniti	on and V	oice-	Acti	vated	Interfaces
0 0		1	0					

SUGGESTEDACTIVITIES

- Create a Design Prototype Using AI Tools
- Build a UI Kit with AI-Generated Elements
- Design and Build a Simple AI Chatbot Interface

SUGGESTEDEVALUATIONMETHODS

- Assess the design of the chatbot interface based on usability, accessibility, and clarity of the conversational flow.
- Evaluate the UI elements created in the project
- Build functional prototypes or web applications that integrate AI tools (chatbots, voice interfaces, content personalization, etc.).

UNITIII INTEGRATING AI AND WEB

Frontend Frameworks and AI Integration - TensorFlow.js with React, Angular, and Vue.js- Integrate AI Models into Web Components - Serverless AI: Combining APIs and Frontend Development- Machine Learning in the Browser with TensorFlow.js-AI-Powered Image Editing and Enhancement -Face and Object Recognition with JavaScript –Real-Time Predictions and Image Classifications.

SUGGESTEDACTIVITIES

- Integrating TensorFlow.js with a Frontend Framework
- Build a Serverless AI Application

SUGGESTEDEVALUATIONMETHODS

- Evaluate students based on their ability to integrate TensorFlow.js with the chosen framework and the functionality of the AI model
- Test the web app to ensure it properly integrates with the AI API and handles responses efficiently.

UNITIV DEPLOYMENT AND OPTIMIZATIO

Reinforcement Learning for User Interaction Optimization -Definition-Use Cases for Reinforcement Learning in UI/UX-AI-Powered Search and Data Exploration:Real-Time Data Exploration with AI - Building - Deploying AI Models in Production- Optimizing AI Models for Web Performance -Monitoring and Updating Models in Real-Time-Case Study: AI for Filtering and Sorting Content.

SUGGESTEDACTIVITIES

- Develop a Real-Time Data Exploration Dashboard
- End-to-End Deployment of AI Models for Web Applications

SUGGESTEDEVALUATIONMETHODS

- Test the real-time monitoring system, ensuring it accurately tracks model performance and triggers updates when necessary.
- Test the AI-powered accessibility feature with users, especially those with disabilities, to assess its effectiveness and usability.

UNITV	AI DRIVEN WEB INTERACTIONS	9

9

9

Emerging Trends in AI and Web Development – AI and the Evolution of Web Design - The Role of Augmented Reality (AR) and Virtual Reality (VR)- Preparing for an AI-Driven Future in Web Development - The Changing Role of Front-End Developers with AI- Preparing for an AI-First Web Development -Future Embracing the AI Revolution in Front-End Development.

SUGGESTEDACTIVITIES

- Create an AI-Enhanced Web Design Prototype
- Build an AR/VR Experience with AI Integration

SUGGESTEDEVALUATIONMETHODS

- Evaluate the design for creativity, use of AI, and how well the AI tools have been integrated into the workflow.
- Demonstrate the execution of the AI-first strategy, including the effectiveness of AI integration in the web application.

TotalPeriods

SuggestiveAssessmentMethods

ContinuousAssessmentTest	FormativeAssessmentTest	EndSemesterExams
(20Marks)	(20Marks)	(60Marks)
1. DESCRIPTIVEQUESTIONS	1.ASSIGNMENT	1. DESCRIPTIVE
2. PROBLEM	2. ONLINEQUIZZES	QUESTIONS
SOLVINGQUESTIO NS	3.PROBLEM-	2. HIGHER ORDER PROBLEM
110	SOLVINGACTIVITIE S	SOLVINGQUESTIONS

CourseOutcomes

Uponcompletion of the course, the students will be able to:

CO1Develop web pages using HTML for semantic structure, CSS for styling, and JavaScript for dynamic behavior. (Understand)

CO2Build intelligent, interactive web applications using AI tools and models. (Apply)

CO3Implement dynamic user interfaces that respond to AI-powered outputs, enhancing user interaction and engagement. (Analyze)

CO4Build AI-driven features that allow users to explore vast datasets dynamically, using natural language queries or predictive search suggestions. (Apply)

CO5Develop interactive AR/VR applications that use web-based tools for creating immersive, real-time environments in a browser.(Apply)

Text Books

1. "Deep Learning with JavaScript: Neural Networks in TensorFlow.js" by ShanqingCai, Stanley Bileschi, and Max Pumperla,2020.

ReferenceBooks

- 1. Front-end Developer Handbook 2019 by Cody Lindley.
- 2. "HTML and CSS: Design and Build Websites" by Jon Duckett,2011.
- 3. "Vue.js Up and Running: Building Accessible and Performant Web Apps" by Callum Macrae, 2018.
- 4. "Learning TensorFlow.js Powerful Machine Learning in JavaScript" by Gant Laborde.2021.

45

- 5. Generative AI in frontend web development: A comparison between AI as a tool and as a sole programmer.
- 6. Artificial Intelligence-driven web development and agile project management using OpenAI API and GPT technology.

WebResources

- 1. https://www.researchgate.net/publication/383866997_The_Impact_of_AI_on_Web_Developme nt
- 2. https://www.researchgate.net/publication/383170137_Artificial_Intelligence_in_Web_Develop ment_Enhancing_Automation_Personalization_and_Decision-Making
- 3. https://www.geeksforgeeks.org/front-end-development/
- 4. <u>https://www.youtube.com/watch?v=zJSY8tbf_ys</u>

COVsPOMappingandCOVsPSOMapping

С	PO	PO1	PO1	PSO	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	1	2	3
1	3	3	3			2						1		
2	3	3	3			2						1		
3	3	3	3			2						2		
4	3	3	3			2						2		
5	3	3	3			2						3		

BLOOMSLEVELASSESSMENTPATTERN

BLOOMSC ATEGORY	CAT1	CAT2	FAT1	FAT2	ENDSEMEX AM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

COURSELEVELASSESSMENTQUESTIONS

CourseOutcome1 (CO1):(Understand)

- **1.** How can AI enhance front-end development? Provide at least two examples of how AI is being used in web development today.
- 2. Explain how a pre-trained machine learning model can be deployed on a

front-end web application. What are the benefits of using pre-trained models in web development?

3. Discuss the evolution of AI in web development. How has the use of AI in web design and user interactions changed over the past few years?

CourseOutcome2 (CO2):(Apply)

- 1. What is generative design in the context of web design, and how can AI be used to generate UI elements automatically?
- 2. Describe the key steps involved in building an AI-powered chatbot for customer support. How does the chatbot learn from user interactions? Write a program to input the elements of a two-dimensional array.
- 3. In the case of a customer support chatbot, explain how AI can be used to handle customer inquiries. What factors should be considered when designing an AI chatbot to ensure it provides accurate and helpful responses?

CourseOutcome3 (CO3):(Analyze)

- 1. Explain how you would integrate a pre-trained machine learning model (such as a text classifier or image recognizer) into a custom web component. How does the model interact with the DOM?
- 2. Explain the difference between running machine learning models in the browser using TensorFlow.js and deploying them on a server. What are the trade-offs in terms of performance, scalability, and user experience?
- 3. Explain the process of implementing object detection and recognition in a web application. What machine learning model would you use, and how would you integrate it with a web app built with React, Angular, or Vue?

Course Outcome 4(CO4): (Apply)

- 1. What is the role of machine learning in improving search relevance and ranking in e-commerce websites?
- 2. How can AI models be updated in real-time based on new data or user interactions? Explain how this is done for a recommendation engine or personalization algorithm.
- 3. How can reinforcement learning help optimize the accessibility features of a website over time? For instance, adjusting content based on users' needs or preferences (e.g., font size, color schemes)?

CourseOutcome 5(CO5):(Apply)

- 1. How has AI influenced the evolution of web design? Provide specific examples of AI tools or techniques that have enhanced the web design process.
- 2. Discuss the role of AI in object recognition, gesture tracking, and scene understanding within AR and VR environments.Explain how front-end developers can leverage AI-powered design and coding tools (such as AI-based code completion, design tools, etc.)

Prepared By

Verified By

Ms.AbrinMubina,AP/AI&DS

Dr.A.Anitha,HoD /AI&DS

Sl.No	Coursecode	CourseName	Sem	L	T
1.	24AI4S01	BusinessIntelligenceTools	4	2	C
2.	24AI5S01	Business Analytics with R	5	2	C
3.	24AI6S01	Augmented Analytics	6	3	C
4.	24AI7S01	AI Powered Decision Intelligence	7	3	C
5.	24AI8S01	ProjectWork	8	0	C

2444604		L	Т	Р	C
24AI4501	BUSINESS INTELLIGENCE TOOLS	2	0	2	3
Preamble					
This course for data us. The st on the same comprehensiv modular appli	cuses on business intelligence tools used for storage, analysis an cudent will learn about fundamentals of intelligence tools and hav It also help to develop projects and apply existing data analy e knowledge on Data analytics on business. This will enable the s cations related to the field of engineering.	nd ma ve han ytics tuder	nipul d on tools its to	ation trainin to ga develo	of ng in op
Prerequisites	s for the course				
ProbabilData scie	ity and statistics ence essentials				
Objectives					
1. To U 2. To u 3. To u 4. To g 5. To v	nderstand the methodology and technique of business intelligence nderstand the analytic modelingbehind MS EXCEL nderstand the knowledge of using tableau tools for analytics enerate reports for the data using data studio tools isualize the data modeling concepts using POWER BI.	2			
UNIT I	INTRODUCTION TO BUSINESS INTELLIGENCE			6	
Definition of Bu – Business inte Tasks and analy SUGGESTED A	usiness intelligence- Business intelligence scenarios- perspectives in E Iligence views on business process- goals of business intelligence- b ysis formats ACTIVITIES	3usine ousine	ss inte	elligen elligen	ce
Discuss	ion on case studies of business intelligence				
Basic ir	ntroduction about various business intelligence user interface				
SUGGESTED H	EVALUATION METHODS				
Quizzes	s on business intelligence tasks and analysis formats				
Assignt	nent on business intelligence views on business process MS EXCEL			6	
Getting starte	d with excel-working with data- working with charts-describing	g data ion	a- pro	babili	ty
SUGGESTED F					
Demon	strate the use of concatenation and data validation				
SUGGESTED I	EVALUATION METHODS				
Demon	stration of programs using sorting and filtering				
Demon	stration on cleaning data with text functions				

UNIT III	TABLEAU		6						
Introduction t	o visualization and tableau Introduction to Dimensions and	Measures, Bar Ch	art.						
Line Chart, Ta	ble, Heat Map, Treemap, Packed Bubble, Tooltip, Calculated F	ields, Parameters,	<u> </u>						
Introduction t	o Level of Detail- chart forms-Dashboard								
SUGGESTED A	ACTIVITIES								
Compa	rison study on the various types of data preparation techniqu	ies							
Demon	strate various join operation using tableau								
SUGGESTED I	EVALUATION METHODS								
Demon	stration of aggregated data using tableau builder tool								
Demon	stration of various pivoting operations								
Quiz or	n basics of Tableau prep builder user interfaces								
UNIT IV	R STUDIO		6						
Introduction to	R studio- creating variables and assigning data- using vectors	and factors – using	g lists-						
using data class	ses-Looping statements- decision support statements-if/else- us	ing function	-						
SUGGESTED A	SUGGESTED ACTIVITIES								
Discuss	tion and comparison of various business intelligence tools with	th R studio							
Demon	strate various programs for looping statements								
SUGGESTED I	EVALUATION METHODS								
Demon	stration of vectors and factors using R studio								
Quizze	s on how to use decision support statements								
UNIT V	POWER BI		6						
Power Bl intro	duction- power BI Architecture-Combine multiple files and fold	ders, Merge and ag	pend,						
Custom calcula	tions Conditional columns, Column from examples, Publishing to	Power Bl Service,	Power						
<mark>BI dataflows, D</mark>	ashboards and Cross-Reporting								
SUGGESTED A	ACTIVITIES								
Assigni	nent on Power BI architecture								
Compa	risons of power BI with other BI tools								
Demon	strate how to create Dash boards								
SUGGESTED I	EVALUATION METHODS								
Demonstration of programs for creating dash board									
• Demon	stration of various visualization option in power BI								
	Total Periods	30							
S.NO	LIST OF EXPERIMENTS	СО							
1	Web scraping using MS Excel from job portals	C01,C02							
2	Data scrubbing using MS Excel for Data. World datasets	C01,C02							

3	Exploratory data a	analysis using Tableau for sales da	itaset	CO3					
4	Exploratory data a Netflix data	nalysis using data studio for lates	t	CO4					
5	Amazon product re	views using power Bl		CO5					
6	Twitter sentimenta		C05						
Total Periods 30 Theory+30 lab									
Suggestive	e Assessment Method	S							
Continuou	ısAssessmentTest	LabComponentsAssessments	E	ndSemesterExams					
(301	Marks)	(20Marks)		(50Marks)					
1.DESCRI	IPTIVEQUESTIONS	1. LABEXPERIMENTS	PERIMENTS 1.DES						
		2. MODELEXAMINATION							
Course Ou	itcomes	<u> </u>							
Upon com	pletion of the course,	the students will be able to:							
CO1 Introd	luce the concept and co	omponents of business intelligenc	e tools(l	Inderstand)					
CO2 Applyi	ng data analytics using	gMs-Excel(Apply)							
CO3Define	how BI tools will help	to analyse and organize data usin	g tablea	u(Apply)					
CO4 Link b	ousiness intelligence wi	ith data analytics using data studi	o (Ap	ply)					
CO5 applying the visualization concept using power BI (Apply)									
Text Book	S								
1. V s	Vilfred Grossmann , S pringer 2015	Stefanie Rinderle-Ma, "Fundame	ntals of	business intelligence"					

- 2. Kenneth N. Berk ,Patrick Carey ,"Data analysis with Microsoft excel", Brooks/COLE cencage learning, 2007
- 3. Seema Acharya, subhashinichellapan, "Pro tableau"- step by step guide A press, 2017
- 4. Eric pimple, "Data visualization and exploration with R" A practical guide to R, R studio, for data visualization, exploration and data science application, Geo spatial service, 2017
- 'Rob collie' & 'Avi singh', "power pivot and power BI"- The Excel user's guide to DAX, power query, power BI and power pivot in Excel 2010-2016.: Holy Macro! Books, PO Box 541731 Merritt Island FL 32954 USA 2016

Reference Books

1. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2011

2. "Business Intelligence – Grundlagen und praktischeAnwendungen: Eine Einführung in die IT" by Hans-Georg Kemper and Henning Bars.

Web Resources

- https://www.google.com/search?q=tableau+tutorial+point+pdf+free+download
- https://www.tutorialspoint.com/msexcel/index.htm
- https://www.tutorialspoint.com/powerbi/index.htm
- .https://www.tutorialspoint.com/googledatastudio/index.htm

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2	PSO3
1	3	3	3			2							1		
2	3	3	3			2							1		
3	3	3	3			2							2		
4	3	3	3			2							2		
5	3	3	3			2							3		

CO Vs PO Mapping and CO Vs PSO Mapping

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

Course Outcome 1 (CO1):

1. How business intelligence BI systems are used for reporting and data analytics?(understand)

2. What are the five stages of BI?(Remember)

Course Outcome 2 (CO2):

1. Data on soft drink sales shown in Table have been saved in a text fi le. The file has five variables and ten cases. The first variable is the name of the soft drink brand; the next three variables are company sales in millions of 192-ounce cases for the years 2000, 2001, and 2002. (Source: http://www.bevnet.com/ news/2002/03-01-2002-softdrink.asp, Beverage Marketing Corporation.) The final column indicates the year of origin for each brand

Brand	Cases2000	Cases2001	Cases2002	Origin
Coca-Cola	3198.0	3189.6	3288.9	1886
Pepsi	2188.0	2163.9	2156.4	1898
Mountain Dew	810.3	853.7	862.7	1946
Dr Pepper	747.4	740.0	737.4	1885
Sprite	713.9	703.3	687.9	1961
Gatorade	355.8	375.0	422.8	1965
7 Up	276.0	261.6	243.4	1929
Tropicana	301.2	307.7	292.9	1954
Minute Maid	218.0	226.5	285.3	1946
Aquafina	105.0	151.4	203.0	1994

- i. Create range names for each of the five data columns in the workbook.
- ii. Create two new columns displaying the change in sales from 2000 to 2002 and the ratio of the 2000 sales to the 2002 sales. Assign range names to these two new columns. Sort the list in descending order of the difference in sales (analyze)
- 2. A data distribution has a median value of 22, a first-quartile value of 20, and a third-quartile value of 30. Five observations lie outside the interval from the first to the third quartile, with values of 17, 18, 40, 50, and 75. a. Draw the boxplot for this distribution. b. Is the skewness positive, negative, or zero? Excel (apply)

Course Outcome 3 (CO3):

- 1. For any health care, do extraction, transformation and finally visualizing the output using Tableau.(apply)
- 2. Perform market basket analysis to determine the product that together garnered the maximum sales of a company data (apply)

	Sub-Category												20		
Sub-Categor.	Accesso	Applianc.	Art	Binders	Bookcas	Chaire	Copiers	Envelop.	Fasteners	Furnishi	Labels	Machines	Paper	Phones	Storage
Accessories		514	944	1,767	245	703	57	316	270	1,106	411	128	1,587	1,014	955
Appliances	.514		589	1,068	130	403	- 36	101	165	624	210		.907	629	672
Art	944	589		1,760	258	736	79	262	270	1,083	404	334	1,591	1,013	973
Binders	1,767	1,068	1,760		473	1,383	152	625	506	2,073	754	282	3,049	1,918	1.842
Bookcases	248	130	258	473		207	26	69	68	295	129	30	428	300	276
Chairs	703	403	736	1,383	207		64	242	211	896	385	128	1,226	809	760
Copiers	57	35	79	152	28	.64		29	.19	93	- 29	85	146	104	
Envelopes	316	101	202	625	80	242	29		78	- 380	137	- 41	.565	325	345
Fastaners	270	165	270	596	66	211	19	78		324	125	. 51	454	315	290
Furnishings	1,106	62.4	1,683	2,073	293	896	93	300	324		532	176	1,908	1,328	1,230
Labels	415	210	404	754	139	315	39	137	125	532		.66	734	479	458
Machines	128	54	134	282	30	120	15	41	51	176	66		255	159	159
Paper	1,587	837	1,595	3.049	428	1,228	140	505	454	1,900	734	255		1,771	1.895
Phones	1,014	620	1,015	1.918	300	809	104	325	315	1,528	470	159	1,771		1,105
Storage	955	572	973	1.842	270	760	88	345	299	1.230	458	158	1,695	1,105	
Supplies	262	15.5	248	441	60	169	15	77	74	245	81	38	368	232	214
Tables	374	204	349	722	97	282	- 26	129	106	419	160	49	613	410	409

Course Outcome 4 (CO4):

1. Generate a visualizing report by performing the following operations Creating a scatterplot Adding a regression line to a scatterplot ,Plotting categories , Labelling the graph , Legend layouts, Creating a facet, Theming , Creating bar charts , Creating violin plots , Creating density plots for the following data using R

1	Country Name	Country Code	2010	2011	2012	2013	2014	2015	2016	2017
2	Aruba	ABW	101669	102053	102577	103187	103795	104341	104822	105264
3	Afghanistan	AFG	28803167	29708599	30696958	31731688	32758020	33736494	34656032	35530081
4	Angola	AGO	23369131	24218565	25096150	25998340	26920466	27859305	28813463	29784193
5	Albania	ALB	2913021	2905195	2900401	2895092	2889104	2880703	2876101	2873457
6	Andorra	AND	84449	83751	82431	80788	79223	78014	77281	76965
7	Arab World	ARB	356508908	364895878	373306993	381702086	390043028	398304960	406452690	414491886
8	United Arab Emirates	ARE	8270684	8672475	8900453	9006263	9070867	9154302	9269612	9400145
9	Argentina	ARG	41223889	41656879	42096739	42539925	42981515	43417765	43847430	44271041
10	Armenia	ARM	2877311	2875581	2881922	2893509	2906220	2916950	2924816	2930450

2. How do connect R studio with Google ads?(understand)

Course Outcome 5 (CO5):

- 1. Create a stacked column chart using power BI (apply)
- 2. Create a calendar heat map using power BI