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REGULATIONS 2024

B.E. COMPUTER SCIENCE AND ENGINEERING

CHOICE BASED CREDIT SYSTEM

CURRICULUM FOR SEMESTERS I TO VIII

&

SYLLABUS FOR SEMESTERS I TO VI

Prof. A. GOKILAVANI, B.Tech., M.E.,
Head of the Department
Computer Science and Engineering
Jai Shriram Engineering College
Avinashipalayam, Tirupur - 638 660.

JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660
(An Autonomous Institution)
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAACandNBA (CSE and ECE)

REGULATIONS 2024
B.E COMPUTER SCIENCE AND ENGINEERING
CHOICE BASED CREDIT SYSTEM
CURRICULUM FOR I & VIII SEMESTERS

SEMESTER – I

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1.	24UIP001	Induction Program	-	-	-	-	0
		THEORY					
2.	24UHS101	Professional English-I	HSM	3	0	0	3
3.	24UMA101	Matrices and Calculus	BS	3	1	0	4
4.	24UPH101	Engineering Physics	BS	3	0	0	3
5.	24UCY101	Engineering Chemistry	BS	3	0	0	3
6.	24UGE101	Problem Solving and Python Programming	ES	3	0	0	3
7.	24UHS102	தமிழர்மரபு / Heritage of Tamils	HSM	1	0	0	1
		PRACTICAL					
8.	24UGE111	Problem Solving and Python Programming Laboratory	ES	0	0	4	2
9.	24UBS111	Physics and Chemistry Laboratory	BS	0	0	4	2
10.	24UHS111	English Laboratory	EE	0	0	2	1
			Total Credits	**16**	**1**	**10**	**22**

SEMESTER – II

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		THEORY					
1.	24UHS201	Professional English-II	HSM	2	0	0	2
2.	24UMA201	Statistics and Numerical Methods	BS	3	1	0	4
3.	24UGE201	Environmental Science and Sustainability	BS	3	0	0	3
4.	24UCS201	Programming in C	ES	3	0	0	3
5.	24UHS202	தமிழரும்தொழில்நுட்பமும் /Tamils and Technology	HSM	1	0	0	1
		THEORY CUM PRACTICAL					
6.	24UECI221	Digital Principles and Design	ES	3	0	2	4
		PRACTICAL					
7.	24UGE211	Engineering Fundamentals Laboratory	ES	0	0	4	2
8.	24UCS211	Programming in C Laboratory	ES	0	0	4	2
9.	24UHS211	Communication Laboratory	EE	0	0	4	2
			Total Credits	**15**	**1**	**14**	**23**

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SEMESTER – III

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1.	24UMA302	Discrete Mathematics	BS	3	1	0	4
2.	24UCS301	Data Structures	PC	3	0	0	3
3.	24UCS302	Object Oriented Programming	PC	3	0	0	3
4.	24UCS303	Operating Systems	PC	3	0	0	3
THEORY CUM PRACTICAL							
5.	24UCSI301	Foundations of Data Science	PC	3	0	2	4
PRACTICAL							
6.	24UCS311	Data Structures Laboratory	PC	0	0	4	2
7.	24UCS312	Object Oriented Programming Laboratory	PC	0	0	4	2
8.	24UCS313	Operating Systems Laboratory	PC	0	0	4	2
9.	24UCS314	Skill Development Laboratory - I	EE	0	0	2	1
			Total Credits	**15**	**1**	**16**	**24**

SEMESTER – IV

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1.	24UCS401	Web Technology	PC	3	0	0	3
2.	24UCS402	Database Management Systems	PC	3	0	0	3
3.	24UCS403	Design and Analysis of Algorithms	PC	3	0	0	3
4.	24UCS404	Theory of Computation	PC	3	0	0	3
5.	24UCS405	Computer Organization and Architecture	PC	3	0	0	3
THEORY CUM PRACTICAL							
6.	24UADI421	Artificial Intelligence and Machine Learning	PC	3	0	2	4
PRACTICAL							
7.	24UCS411	Web Technology Laboratory	PC	0	0	4	2
8.	24UCS412	Database Management Systems Laboratory	PC	0	0	4	2
9.	24UCS413	Algorithms Laboratory	PC	0	0	4	2
			Total Credits	**18**	**0**	**14**	**25**

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SEMESTER – V

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1.	24UCS501	Computer Networks	PC	3	0	0	3
2.	24UCS502	Full Stack Development	PC	3	0	0	3
3.	24UCS503	Compiler Design	PC	3	0	0	3
4.		Professional Elective I	PE	-	-	-	3
5.	24UGE501	Human Values and Ethics	HSM	3	0	0	3
6.		Open Elective – I	OE	3	0	0	3
7.		Mandatory Course-I	MC	3	0	0	Non credit
PRACTICAL							
8.	24UCS511	Computer Networks Laboratory	PC	0	0	4	2
9.	24UCS512	Full Stack Development Laboratory	PC	0	0	4	2
10.	24UCS513	Skill Development Laboratory - II	EE	0	0	2	1
			Total Credits	**18**	**0**	**10**	**23**

SEMESTER – VI

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1.	24UIT601	Agile Software Development	PC	3	0	0	3
2.	24UCS602	Cryptography and Network Security	PC	3	0	0	3
3.		Professional Elective II	PE	-	-	-	3
4.		Professional Elective III	PE	-	-	-	3
5.		Professional Elective IV	PE	-	-	-	3
6.		Open Elective – II	OE	3	0	0	3
7.		Mandatory Course-II	MC	3	0	0	NC
PRACTICAL							
8.	24UCS611	Mini Project	EE	0	0	4	2
			Total Credits	**12**	**0**	**4**	**20**

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SEMESTER – VII

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		THEORY					
1.	24UMG701	Principles of Management	HSM	3	0	0	3
2.		Professional Elective V	PE	3	0	0	3
3.		Professional Elective VI	PE	3	0	0	3
4.		Open Elective – III	OE	3	0	0	3
		PRACTICAL					
5.	24UCS711	Summer Internship	EE	0	0	0	2
			Total Credits	**12**	**0**	**0**	**14**

SEMESTER – VIII

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		PRACTICAL					
1.	24UCS811	Project Work	EE	0	0	20	10
			Total Credits	**0**	**0**	**20**	**10**

Total Credits: 161

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PROFESSIONAL ELECTIVES

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
PROFESSIONAL ELECTIVE I							
1.	24UCSP501	Application Development	PE	2	0	2	3
2.	24UCSP502	Virtualization	PE	2	0	2	3
3.	24UCSP503	Cryptocurrency and Blockchain Technologies	PE	3	0	0	3
4.	24UCSP504	Digital Marketing	PE	2	0	2	3
5.	24UCSP505	Game Development	PE	2	0	2	3
PROFESSIONAL ELECTIVE II							
1.	24UCSP601	Distributed Computing	PE	3	0	0	3
2.	24UCSP602	Cloud Computing	PE	2	0	2	3
3.	24UCSP603	Big Data Analytics	PE	2	0	2	3
4.	24UCSP604	Augmented Reality/Virtual Reality	PE	2	0	2	3
5.	24UCSP605	Business Analytics	PE	2	0	2	3
PROFESSIONAL ELECTIVE III							
1.	24UCSP606	Software Testing and Automation	PE	2	0	2	3
2.	24UCSP607	Cloud Services Management	PE	2	0	2	3
3.	24UCSP608	Digital and Mobile Forensics	PE	3	0	0	3
4.	24UCSP609	Computer Vision	PE	2	0	2	3
5.	24UCSP610	Quantum Computing	PE	2	0	2	3
PROFESSIONAL ELECTIVE IV							
1.	24UCSP611	DevOps	PE	2	0	2	3
2.	24UCSP612	Security and Privacy in Cloud	PE	2	0	2	3
3.	24UCSP613	Social Network Security	PE	3	0	0	3
4.	24UCSP614	Recommender Systems	PE	2	0	2	3
5.	24UCSP615	UI and UX Design	PE	2	0	2	3
PROFESSIONAL ELECTIVE V							
1.	24UCSP701	NoSQL	PE	2	0	2	3
2.	24UCSP702	Storage Technologies	PE	3	0	0	3
3.	24UCSP703	Text and Speech Analysis	PE	2	0	2	3
4.	24UCSP704	Object Oriented Software Engineering	PE	2	0	2	3
5.	24UCSP705	Visual Effects	PE	2	0	2	3

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PROFESSIONAL ELECTIVE VI							
1.	24UCSP706	Service Oriented Architecture	PE	3	0	0	3
2.	24UCSP707	Web Application Security	PE	2	0	2	3
3.	24UCSP708	Neural Networks and Deep Learning	PE	2	0	2	3
4.	24UCSP709	Multimedia and Animation	PE	2	0	2	3
5.	24UCSP710	Optimization Techniques	PE	2	0	2	3

OPEN ELECTIVES

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1.	24UCEO01	Augmented Reality /Virtual Reality	OE	3	0	0	3
2.	24UCEO02	Remote Sensing Concepts	OE	3	0	0	3
3.	24UCEO03	Geographical Information System	OE	3	0	0	3
4.	24UCEO04	Fire Safety Engineering	OE	3	0	0	3
5.	24UCSO01	Java Programming	OE	3	0	0	3
6.	24UCSO02	UI & UX Design	OE	3	0	0	3
7.	24UCSO03	Cloud Computing	OE	3	0	0	3
8.	24UCSO04	Data Science	OE	3	0	0	3
9.	24UEEO01	Renewable Energy Technologies	OE	3	0	0	3
10.	24UEEO02	Hybrid Electric Vehicles	OE	3	0	0	3
11.	24UEEO03	Introduction to PLC Programming	OE	3	0	0	3
12.	24UEEO04	Energy Conservation & Management	OE	3	0	0	3
13.	24UEEO05	Fundamentals of Electronic Devices	OE	3	0	0	3
14.	24UEEO06	Batteries and Management System	OE	3	0	0	3
15.	24UEEO07	Sensors and Actuators	OE	3	0	0	3
16.	24UEEO08	Electrical, Electronic & Magnetic Materials	OE	3	0	0	3
17.	24UECO01	Basics of Communication Technologies	OE	3	0	0	3
18.	24UECO02	Image Processing	OE	3	0	0	3
19.	24UECO03	Basics of IoT	OE	3	0	0	3
20.	24UECO04	Introduction to PLC Programming	OE	3	0	0	3
21.	24UECO05	Sensors for Engineering Applications	OE	3	0	0	3
22.	24UECO06	Industry 4.0 and Industrial IoT	OE	3	0	0	3
23.	24UFTO01	Basics of Textile Technology	OE	3	0	0	3
24.	24UFTO02	Fundamentals of Fashion Design	OE	3	0	0	3
25.	24UFTO03	Garment Manufacturing Technology	OE	3	0	0	3
26.	24UFTO04	Retail Management	OE	3	0	0	3
27.	24UFTO05	Industrial Engineering for Garment Industry	OE	3	0	0	3
28.	24UFTO06	Fashion Branding and Advertisement	OE	3	0	0	3

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29.	24UMEO01	Fundamentals of Robotics	OE	3	0	0	3
30.	24UMEO02	Nano Technology	OE	3	0	0	3
31.	24UMEO03	Reverse Engineering	OE	3	0	0	3
32.	24UMEO04	Industrial Engineering	OE	3	0	0	3
33.	24UMEO05	Introduction to Additive Manufacturing	OE	3	0	0	3
34.	24UMEO06	Energy Conservation in Industries	OE	3	0	0	3
35.	24UITO01	Digital Image Processing and Its Applications	OE	3	0	0	3
36.	24UITO02	Fundamentals of Databases	OE	3	0	0	3
37.	24UITO03	Internet Programming	OE	3	0	0	3
38.	24UITO04	Fundamentals of Internet of Things	OE	3	0	0	3
39.	24UITO05	Fundamentals of Blockchain	OE	3	0	0	3

MANDATORY COURSES I

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1.	24UMC801	Introduction to Women and Gender Studies	MC	3	0	0	0
2.	24UMC802	Automotive Safety	MC	3	0	0	0
3.	24UMC803	State, Nation Building and Politics in India	MC	3	0	0	0
4.	24UMC804	Disaster Risk Reduction and Management	MC	3	0	0	0
5.	24UMC805	Film Appreciation	MC	3	0	0	0
6.	24UMC806	Elements of Literature	MC	3	0	0	0
7.	24UMC807	Inclusive Work Culture	MC	3	0	0	0
8.	24UMC808	Quality Systems	MC	3	0	0	0
9.	24UMC809	Industrial Practices and Requirements	MC	3	0	0	0

MANDATORY COURSES II

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1.	24UMC901	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	0
2.	24UMC902	History of Science and Technology in India	MC	3	0	0	0
3.	24UMC903	Political and Economic Thought for a Humane Society	MC	3	0	0	0
4.	24UMC904	Industrial Safety	MC	3	0	0	0
5.	24UMC905	Quantitative and verbal proficiency	MC	3	0	0	0
6.	24UMC906	Industrial Hydraulic Circuits	MC	3	0	0	0
7.	24UMC907	Electrical Safety	MC	3	0	0	0

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CREDITS SUMMARY

S.No.	Subject Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII/ VIII	VIII/ VII	
1	HSM	4	3			3		3		13
2	BS	12	7	4						23
3	ES	5	11							16
4	PC			19	25	13	6			63
5	PE					3	9	6		18
6	OE					3	3	3		9
7	EE	1	2	1		1	2	2	10	19
8	Non-Credit /(Mandatory					√	√			
Total		22	23	23.5	24.5	23	20	14	10	161

Total Credits for the entire Programme: 161

COMPARISON OF CREDIT SUMMARY

S. No	Course Components	AICTE Recommendation		Anna University Curriculum R2021		JSREC Autonomous Curriculum R2024	
		Credits	% Credits	Credits	% Credits	Credits	% Credits
1	Humanities, Social Science and Management (HSM)	16	10%	12	7%	13	8%
2	Basic Sciences (BS)	23	14%	25	15%	23	14%
3	Engineering Sciences (ES)	29	18%	18	11%	16	10%
4	Professional Core (PC)	59	36%	61	38%	63	39%
5	Professional Electives (PE)	12	7%	18	11%	18	11%
6	Open Electives (OE)	9	6%	12	7%	9	6%
7	Employment Enhancement Course (EE)	15	9%	16	10%	19	12%
8	Mandatory (Non-Credit Course (MC)	-	-	-	-	√	√
TOTAL CREDITS		163	100%	162	100%	161	100%

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B.E. COMPUTER SCIENCE AND ENGINEERING

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SYLLABUS FOR I SEMESTER

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24UHS101	PROFESSIONAL ENGLISH I (Common to all Branches)	L	T	P	C
		3	0	0	3

Prerequisites:
• Basic Knowledge in Language usage

COURSE OBJECTIVES
• To improve the communicative competence of learners • To learn to use basic grammatical structures in suitable contexts • To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text • To help learners use language effectively in professional contexts • To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals

UNIT-I	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	9
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).		

UNIT-II	NARRATION AND SUMMATION	9
Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.		

UNIT-III	DESCRIPTION OF A PROCESS / PRODUCT	9
Reading – Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).		

UNIT-IV	CLASSIFICATION AND RECOMMENDATIONS	9
Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.). Writing – Note-making / Note-taking (*Study skills to be taught, not tested); Writing recommendations; Transferring information from non verbal (chart, graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.		

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UNIT-V	EXPRESSION	9
Reading – Reading editorials; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative). Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, 27 Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.		

L: 45	T: 00	P: 00	Total : 45 Periods

TEXT BOOKS

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. VeenaSelvam, Dr.SujathaPriyadarshini, Dr.Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES

1. Technical Communication – Principles And Practices By Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By AyshaViswamohan, Mcgraw Hill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

WEB RESOURCES

- https://www.liseduнetwork.com/the-fundamentals-of-communication/#google_vignette
- http://hdl.handle.net/10603/58170
- https://www.vedantu.com/english/narration
- https://asana.com/resources/product-development-process
- https://onlinelibrary.wiley.com/doi/10.1155/2019/8043905

COURSE OUTCOMES

At the end of the course students should be able to

CO1:To use appropriate words in a professional context
CO2:To gain understanding of basic grammatical structures and use them in right context
CO3:To read and infer the denotative and connotative meanings of technical texts
CO4:To read and interpret information presented in tables, charts and other graphic forms
CO5:To write definitions, descriptions, narrations and essays on various topics

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24UMA101	MATRICES AND CALCULUS (Common to All Branches)	L	T	P	C
		3	1	0	4

Prerequisites:

- Knowledge in Basic Calculus

COURSE OBJECTIVES

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT-I	MATRICES	9 + 3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.

UNIT-II	DIFFERENTIAL CALCULUS	9 + 3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT-III	FUNCTIONS OF SEVERAL VARIABLES	9 + 3

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

UNIT-IV	INTEGRAL CALCULUS	9 + 3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT-V	MULTIPLE INTEGRALS	9 + 3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves - Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications: Moments and centres of mass, moment of inertia.

L:45	T: 15	P: 00	Total : 60 Periods

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TEXT BOOKS

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and ManicavachagomPillai. T. K.,"Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, "Engineering Mathematics "Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus ", 14th Edition, Pearson India, 2018.

WEB RESOURCES

- http://explained.ai/matrix-calculus/index.html
- https://www.comp.nus.edu.sg/~cs5240/lecture/matrix-differentiation.pdf
- https://github.com/LynnHo/Matrix-Calculus
- https://nptel.ac.in/

COURSE OUTCOMES

At the end of the course students should be able to

CO1:Use the matrix algebra methods for solving practical problems.

CO2:Apply differential calculus tools in solving various application problems.

CO3:Able to use differential calculus ideas on several variable functions.

CO4:Apply different methods of integration in solving practical problems.

CO5:Apply multiple integral ideas in solving areas, volumes and other practical problems.

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24UPH101	ENGINEERING PHYSICS (Common to All Branches)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To make the students effectively achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT-I	MECHANICS	9

Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT-II	ELECTROMAGNETIC WAVES	9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT-III	OSCILLATIONS, OPTICS AND LASERS	9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT-IV	BASIC QUANTUM MECHANICS	9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes-Normalization, probabilities and the correspondence principle.

UNIT-V	APPLIED QUANTUM MECHANICS	9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)-Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

L:45	T: 00	P: 00	Total : 45 Periods

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TEXT BOOKS

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, ShobhitMahajan, S. RaiChoudhury, Concepts of Modern Physics, McGraw- Hill (Indian Edition), 2017.

REFERENCES

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer- Verlag, 2012.

WEB RESOURCES

- https://www.youtube.com/watch?v=caitynfev64
- https://youtu.be/SqhWxOjBb74
- https://youtu.be/Fl1MHPĐd5D8
- https://youtu.be/NGGSROr3Tlc
- https://youtu.be/b-w4TSkhlhE

COURSE OUTCOMES

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

CO1:Understand the importance of mechanics.
CO2:Express their knowledge in electromagnetic waves.
CO3:Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
CO4:Understand the importance of quantum physics.
CO5:Compare and apply quantum mechanical principles towards the formation of energybands.

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24UCY101	ENGINEERING CHEMISTRY (Common to all Branches)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT-I	WATER AND ITS TREATMENT	9

Water: Sources and impurities, Water quality parameters: Definition and significance of- color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackishwater: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment (Phosphate, Colloidal, Sodiumaluminate and Calgon conditioning) and External treatment—Ion exchange demineralization and Zeolite process.

UNIT-II	NANO CHEMISTRY	9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT-III	PHASE RULE AND COMPOSITES	9

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process. Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

UNIT-IV	FUELSAND COMBUSTION	9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil- cetane number; Power alcohol and biodiesel. Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO_2 emission and carbon footprint.

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UNIT-V	ENERGY SOURCESAND STORAGE DEVICES	9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion- battery; Electric vehicles - working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuelcell; Supercapacitors: Storage principle, types and examples.

L:45	T: 00	P: 00	Total : 45 Periods

TEXT BOOKS

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCES

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

WEB RESOURCES

- https://testbook.com/ias-preparation/water-treatment
- https://onlinelibrary.wiley.com/doi/full/10.1002/nano.202300038
- https://www.pratapsir.com/2023/01/notes-on-phase-rule_21.html
- https://en.wikipedia.org/wiki/Fuel

COURSE OUTCOMES

At the end of the course students should be able

CO1:To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.

CO2:To identify and apply basic concepts of nano science and nanotechnology in designing the synthesis of nano materials for engineering and technology applications.

CO3: To apply the knowledge of phase rule and composites for material selection requirements.

CO4: To recommend suitable fuels for engineering processes and applications.

CO5: To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

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24UGE101	PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to All Branches)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT-I	COMPUTATIONAL THINKING AND PROBLEM SOLVING	9

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

UNIT-II	DATA TYPES, EXPRESSIONS, STATEMENTS	9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string , and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT-III	CONTROL FLOW, FUNCTIONS, STRINGS	9

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

UNIT-IV	LISTS, TUPLES, DICTIONARIES	9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT-V	FILES, MODULES, PACKAGES	9

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

L:45	T:0	P:0	Total: 45 PERIODS

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TEXT BOOKS
1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 3rd Edition, O'Reilly Publishers, 2024. 2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2022.
REFERENCES
1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021. 2. G Venkatesh and MadhavanMukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021. 3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021 4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019. 5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

WEB RESOURCES
• https://www.python.org/ • https://nptel.ac.in/courses/106106145/
COURSE OUTCOMES Upon completion of the course, the students will be able to
CO1: Develop algorithmic solutions to simple computational problems and and execute simple Python programs. CO2: Write simple Python programs using conditionals and loops for solving problems. CO3: Decompose a Python program into functions. CO4: Represent compound data using Python lists, tuples, dictionaries etc. CO5: Read and write data from/to files in Python programs.

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24UHS102	HERITAGE OF TAMILS (Common to All Branches)	L	T	P	C
		1	0	0	1

Prerequisites:
Nil

COURSE OBJECTIVES

- Appreciate Tamil art, culture and literature.
- Learn the history and culture of Tamil language.
- Relate to various art forms and their relevance to development .
- Acknowledge the rich heritage and significant achievements of the Tamilians.
- Appreciate the contribution of Tamilians to nation building.

UNIT I	LANGUAGE AND LITERATURE	3

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

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

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

UNIT III	FOLK AND MARTIAL ARTS	3

Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV	THINAI CONCEPT OF TAMILS	3

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

UNIT V	CONTRIBUTION OF TAMILS TO INDIAN NATIONALEMENT AND INDIAN CULTURE	3

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

L:15	T: 00	P: 00	Total : 15 Periods

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TEXT-CUM-REFERENCE BOOKS

1) தமிழகவரலாறு - மக்களும்பண்பாடும் - கே .கே .பிள்ளை (வெளியீடு: தழிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2) கணினித்தமிழ் -முனைவர்இல .சுந்தரம்.(விகடன்பிரசுரம்).
3) கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
4) பொருநை - ஆற்றங்கரைநாகரிகம்(தொல்லியல்துறைவெளியீடு)
5) Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print)
6) Social Life of the Tamils – The classical Period (Dr.S.Singaravelu) (Published by: International institute of Tamil Studies).
7) Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.k.D.Thirunavukkarasu) (Published by:Institute of Tamil Studies).
8) The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: Institute of Tamil Studies).
9) Keeladi – Sangam City Civilization on the banks of banks of river Vaigai' (Jointly Published by: Department of archaeology & Tamil Nadu Text book and Educational Services Corporation, Tamil Nadu)
10) Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (published by: The Author).
11) Porunai Civilization (jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12) Journey of Civilzation Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE OUTCOMES

At the end of the course students should be able

- Understand the significance of Tamil as a classical language.
- Relate the art and culture in Tamil language.
- Explain the importance of music, dance and martial arts that were derived from Tamil Culture.
- Understand the poetic mode or theme of classical language.
- Relate the contribution of Tamils to Nation building.

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24UHS102	தமிழர்மரபு (Common to All Branches)	L	T	P	C
		1	0	0	1

அலகு I	மொழிமற்றும்இலக்கியம்	3
இந்தியமொழிக்குடும்பங்கள் - திராவிடமொழிகள் - தமிழ்ஒருசெம்மொழி – தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச்சார்பற்றதன்மை சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க்காப்பியங்கள்,தமிழகத்தில்சமண,பௌத்தசமயங்களின்தாக்கம் - பக்திஇலக்கியம் ,ஆழ்வார்கள்மற்றும்நாயன்மார்கள்-சிற்றிலக்கியங்கள் தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின்பங்களிப்பு.		

அலகுII	மரபு-பாறைஓவியங்கள்முதல்நவீனஓவியங்கள்வரை - சிற்பக்கலை	3
நடுகல்முதல்நவீனசிற்பங்கள்வரை - ஐம்பொன்சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப்பொருட்கள் , பொம்மைகள் - தேர்செய்யும்கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர்சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின்சமூகபொருளாதாரவாழ்வில்கோவில்களின்பங்கு.		

அலகு III	நாட்டுப்புறக்கலைகள்மற்றும்வீரவிளையாட்டுகள்	3
தெருக்கூத்து,கரகாட்டம்,வில்லுப்பாட்டு,கணியான்கூத்து,ஒயிலாட்டம், தோல்வக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின்விளையாட்டுகள்		

அலகு IV	தமிழர்களின்திணைக்கோட்பாடுகள்	3
தமிழகத்தின்தாவரங்களும்,விலங்குகளும்தொல்காப்பியம்மற்றும்சங்கஇலக்கியத்தில் அகம்மற்றும்புறக்கோட்பாடுகள்-தமிழர்கள்போற்றியஅறக்கோட்பாடு சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் சங்ககால நகரங்களும் துறைமுகங்களும்-சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி		

அலகு V	இந்தியதேசியஇயக்கம்மற்றும்இந்தியபண்பாட்டிற்குத்தமிழர்களின்பங்களிப்பு	3
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு –இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப்பண்பாட்டின் தாக்கம் - சுயமரியாதைஇயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ்ப்புத்தகங்களின் அச்சுவரலாறு .		

L:15	T: 00	P: 00	Total : 15 Periods

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TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - கே .கே .பிள்ளை (வெளியீடு: தழிழ்நாடு பாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ் -முனைவர்இல .சுந்தரம்.(விகடன்பிரசுரம்).
3. கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரைநாகரிகம்(தொல்லியல்துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The classical Period (Dr.S.Singaravelu) (Publishid by: International institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.k.D.Thirunavukkarasu) (Published by:Institute of Tamil Studies).
8. The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: Institute of Tamil Studies).
9. Keeladi – Sangam City Civilization on the banks of banks of river Vaigai' (Jointly Published by: Department of archaeology & Tamil Nadu Text book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (published by: The Author).
11. Porunai Civilization (jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilzation Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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24UGE111	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (Common to All Branches)	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:
• To understand the basics of algorithmic problem solving.
• To learn to solve problems using Python conditionals and loops.
• To define Python functions and use function calls to solve problems.
• To use Python data structures - lists, tuples, and dictionaries to represent complex data.
• To do input/output with files in Python.

S.No.	LIST OF EXERCISES:
1	Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuited.)
2	Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3	Scientific problems using Conditionals and Iterative loops.(Number series, Number Patterns, pyramid pattern)
4	Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/Materials required for construction of a building –operations of list & tuples).
5	Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries).
6	Implementing programs using Functions.(Factorial, largest number in a list, area of shape)
7	Implementing programs using Strings.(reverse,palindrome,charactercount,replacing characters).
8	Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy).
9	Implementing real-time / technical applications using File handling.(copy from one file to another, word count, longest word).
10	Implementing real-time / technical applications using Exception handling.(divide by zero error, voter's age validity, student mark range validation).
11	Exploring Pygame tool.
12	Developing a game activity using Pygame like bouncing ball, carrace etc.

L:00	P:60	T:00	Total: 60 PERIODS

LIST OF EQUIPMENTS REQUIRED
HARDWARE REQUIREMENTS
Standard PC
SOFTWARE REQUIREMENTS
1. Windows 7 or higher
2.Python latest version

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COURSE OUTCOMES
Upon completion of the course, the students will be able to
CO1: Develop algorithmic solutions to simple computational problems
CO2: Develop and execute simple Python programs.
CO3: Implement programs in Python using conditionals and loops for solving problems.
CO4: Deploy functions to decompose a Python program.
CO5: Process compound data using Python data structures.
CO6: Utilize Python packages in developing software applications.

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24UBS111	PHYSICS AND CHEMISTRY LABORATORY (Common to All Branches)	L	T	P	C
		0	0	4	2

PHYSICS EXPERIMENTS (Any Seven Experiments)

COURSE OBJECTIVES

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student an active participant in each part of all lab exercises.

1. Torsion pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus.
4. Uniform bending – Determination of Young's modulus.
5. Laser- Determination of the wave length of the laser using grating.
6. Air wedge - Determination of thickness of a thin sheet/wire.
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle.
   b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect.
12. Michelson Interferometer.
13. Melde's string experiment.
14. Experiment with lattice dynamics kit.

TEXT BOOKS

1. Marko Pinteric, Building Physics, Springer 2017.
2. D.S.Mathur. Elements of Properties of Matter. S Chand & Company, 2010.
3. Hugo Hens, Building Physics: Heat, Air and Moisture, Wiley, 2017.

REFERENCES

1. W.R.Stevens. Building Physics: Lighting. Pergamon Press, 2013.
2. Hugo Hens, Applied Building Physics, Wiley, 2016.
3. K.G.Budinski and M.K.Budinski. Engineering Materials: Properties and Selection. Pearson Education, 2016.
4. Peter A. Claisse, Civil Engineering Materials, Elsevier, 2016.

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

CO1:Understand the functioning of various physics laboratory equipment.
CO2:Use graphical models to analyze laboratory data.
CO3:Use mathematical models as a medium for quantitative reasoning and describing physical reality.
CO4:Access, process and analyze scientific information.
CO5:Solve problems individually and collaboratively.

TOTAL: 30 PERIODS

CHEMISTRY EXPERIMENTS (Any Seven Experiments to be conducted)

Prerequisites:

Nil

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles.

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in a water sample. Split the first experiment into two
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium /potassium present in water using a flame photometer.
13. Preparation of nanoparticles (TiO2/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

L: 00	T: 00	P: 60	Total : 60 Periods

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TEXT BOOKS
1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).

WEB RESOURCES
• https://en.wikipedia.org/wiki/Titration • https://en.wikipedia.org/wiki/Conductivity_(electrolytic).
COURSE OUTCOMES At the end of the course students should be able
CO1:To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO. CO2:To determine the amount of metal ions through volumetric and spectroscopic techniques CO3:To analyse and determine the composition of alloys. CO4:To learn simple method of synthesis of nanoparticles. CO5:To quantitatively analyse the impurities in solution by electroanalytical Techniques.

TOTAL: 30 PERIODS

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24UHS111	ENGLISH LABORATORY (Common to all Branches)	L	T	P	C
		0	0	2	1

Prerequisites:

- Basic Knowledge in Language usage

COURSE OBJECTIVES:

- To improve the communicative competence oflearners
- To help learners use language effectively in academic /work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc
- To build on students English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts
- To use language efficiently in expressing their opinions via various media

UNIT-I	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	6

Listening for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form. Speaking - making telephone calls-Self Introduction; Introducing a friend; - 42 politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions(filling out a bank application for example).

UNIT-II	NARRATION AND SUMMATION	6

Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations* - describing experiences and feelings engaging in small talk- describing requirements and abilities.

UNIT-III	DESCRIPTION OF A PROCESS / PRODUCT	6

Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities(large & small)-talking about precautions.

UNIT-IV	CLASSIFICATION AND RECOMMENDATIONS	6

Listening – Listening to TED Talks; Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation.

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UNIT-V	EXPRESSION	6
Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking -making predictions- talking about a given topic-giving opinions- understanding a website-describing processes		

L: 00	T: 00	P: 30	Total : 30 Periods

WEB RESOURCES

- https://www.lisedunetwork.com/the-fundamentals-of-communication/#google_vignette
- http://hdl.handle.net/10603/58170
- https://www.vedantu.com/english/narration
- https://asana.com/resources/product-development-process
- https://onlinelibrary.wiley.com/doi/10.1155/2019/8043905

COURSE OUTCOMES

At the end of the course students should be able to

CO1:To listen to and comprehend general as well as complex academic information

CO2:To listen to and understand different points of view in a discussion

CO3:To speak fluently and accurately in formal and informal communicative contexts

CO4:To describe products and processes and explain their uses and purposes clearly and accurately

CO5:To express their opinions effectively in both formal and informal discussions

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REGULATIONS 2024

B.E. COMPUTER SCIENCE AND ENGINEERING

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR II SEMESTER

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24UHS201	PROFESSIONAL ENGLISH II (Common to all Branches)	L	T	P	C
		2	0	0	2

Prerequisites:
• Basic Knowledge in Language usage

COURSE OBJECTIVES
• To engage learners in meaningful language activities to improve their reading and writing skills • To learn various reading strategies and apply in comprehending documents in professional context • To help learners understand the purpose, audience, contexts of different types of writing • To develop analytical thinking skills for problem solving in communicative contexts • To demonstrate an understanding of job applications and interviews for internship and placements

UNIT-I	MAKING COMPARISONS	6
Reading – Reading comprehension task :Reading strategies, Methods - skimmimg, scanning, parapharasingvs summarizing, Reading advertisements, user manuals, brochures; Proforma invoices Writing – Professional emails, Email etiquette, Creative Writing-Content writing, blog writing , Grammar –Preposition & Prepositional phrases Vocabulary – Words on Engineering materials		

UNIT-II	EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING	6
Reading - Reading longer technical texts, Reading short articles& Journals Writing -Writing responses to complaints, Letters / emails of complaint, writing a travelogue, Agenda with Minutes of meeting(MoM), Cause and Effect Essays, Grammar - If conditional sentences, Active & Passive Voice transformations,		

UNIT-III	PROBLEM SOLVING	6
Reading - Case Studies, excerpts from literary texts, etc. Writing – Letter to the Editor, Sequence of Jumbled paragraph, Checklists, Hints Development - Problem solution essay / Argumentative Essay. Grammar – Error correction; Modals Vocabulary – Idioms and phrases.		

UNIT-IV	REPORTING OF EVENTS AND RESEARCH	6
Reading –Newspaper articles; Writing – Recommendations, Transcoding, Structure of Reports-Accident Report, Survey Report, Project Report Grammar – Reported Speech, Vocabulary – Conjunctions.		

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UNIT-V	THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY	6
Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Business communication letters, Grammar – Numerical adjectives, Relative Clauses, Vocabulary – Infinitive and Gerunds.		

L:30	T: 00	P: 00	Total : 30 Periods

TEXT BOOKS

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.
3. Authored by Dr. VeenaSelvam, Dr.SujathaPriyadarshini, Dr.Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003.
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, MeeraBannerji- Macmillan India Ltd. 1990, Delhi.

WEB RESOURCES

- https://academicguides.waldenu.edu/writingcenter/grammar/comparisons#:~:text=Adjectives%20and%20adverbs%20can%20be,to%20hedge%20or%20boost%20language.
- https://www.linkedin.com/pulse/causality-expressed-natural-language-text-vivek-khetan
- https://www.sessionlab.com/blog/problem-solving-techniques/

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COURSE OUTCOMES **At the end of the course students should be able to**
CO1:Compare and contrast products and ideas in technical texts
CO2:Identify cause and effects in events, industrial processes through technical texts
CO3:Analyse problems in order to arrive at feasible solutions and communicate them orally and in the written format
CO4:Report events and the processes of technical and industrial nature
CO5:Present their opinions in a planned and logical manner, and draft effective resumes in context of job search

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24UMA201	STATISTICS AND NUMERICAL METHODS (Common to All Branches)	L	T	P	C
		3	1	0	4

Prerequisites:
• Basic Knowledge in Scientific Calculator usage

COURSE OBJECTIVES

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems?
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical
- Techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT-I	TESTING OF HYPOTHESIS	9 + 3

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

UNIT-II	DESIGN OF EXPERIMENTS	9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 22 factorial design. Application of Design of experiment SPSS software (Practical oriented).

UNIT-III	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	9 + 3

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

UNIT-IV	INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION	9 + 3

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

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UNIT-V	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	9 + 3

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

L:45	T: 15	P: 00	Total : 60 Periods

TEXT BOOKS

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

REFERENCES

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

WEB RESOURCES

- http://www.davidmlane.com/hyperstat/index.html
- http://www.robertniles.com/stats/
- http://webserv.jcu.edu/math/ISEP/ISEP.htm
- http://rt.uits.iu.edu/visualization/analytics/stats/spss-getting-started-windows.php
- http://www.ats.ucla.edu/stat/

COURSE OUTCOMES

At the end of the course students should be able to

CO1:Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2:Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3:Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.

CO4:Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

CO5:Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

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24UGE201	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY (Common to B.E CSE, B. Tech AI&DS, B.Tech IT)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and non renewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.
- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization..

UNIT-I	ENVIRONMENT AND BIODIVERSITY	9

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

UNIT-II	ENVIRONMENTAL POLLUTION	9

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.

UNIT-III	RENEWABLE SOURCES OF ENERGY	9

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

UNIT-IV	SUSTAINABILITY AND MANAGEMENT	9

Development , GDP ,Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols-Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

UNIT-V	SUSTAINABILITY PRACTICES FOR IT	9

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green computing-benefits and Strategies, Environmental and Cost Benefits of Green Cloud Computing, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Green Engineering: Sustainable urbanization- Socio economical and technological change.

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L: 45	T: 00	P: 00	Total : 45 Periods

TEXT BOOKS

1. AnubhaKaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
7. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

REFERENCES

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.38 .edition 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015.
5. ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient BlackswanPvt. Ltd. 2013.

WEB RESOURCES

- https://en.wikipedia.org/wiki/Biodiversity
- https://en.wikipedia.org/wiki/Pollution
- https://vikaspedia.in/energy/energy-basics/sources-of-energy
- https://blog.se.com/sustainability/2022/06/27/an-introduction-to-sustainability-management-objective-principles-advantage.
- https://www.arenasolutions.com/resources/glossary/sustainable-practices/

COURSE OUTCOMES

At the end of the course students should be able

CO1: To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.

CO2:To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.

CO3:To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations

CO4:To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.

CO5:To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

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24UCS201	PROGRAMMING IN C (Common to B. E CSE, B.TechAI&DS, B.Tech IT)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

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

UNIT-I	BASICS OF C PROGRAMMING	9

Introduction to programming paradigms – Applications of C Language -Structure of C program - C programming: Data Types – Typedef - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Preprocessor directives - Compilation process- Sum of Digits-Prime Number-Quadratic Equation

UNIT-II	ARRAYS AND STRINGS	9

Introduction to Arrays: Declaration, Initialization – One dimensional array –Two dimensional arrays - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

UNIT-III	FUNCTIONS AND POINTERS	9

Modular programming - Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion (Factorial and Fibonacci), Binary Search using recursive functions –Pointers – Pointer operators – Pointer arithmetic –Array of pointers – Parameter passing: Pass by value, Pass by reference.

UNIT-IV	STRUCTURES AND UNION	9

Structure - Nested structures – Pointer and Structures – Array of structures – Self referential structures – Dynamic memory allocation - Union - Storage classes and Visibility.

UNIT-V	FILE PROCESSING	9

Files – Types of file processing: Sequential access, Random access – Sequential access file - Random access file - Command line arguments.

L:45	T:0	P:0	Total: 45 PERIODS

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TEXT BOOKS

1. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2015.

REFERENCES

1. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition,Pearson Education, 2018.
2. YashwantKanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw- Hill Education, 1996.
4. PradipDey, ManasGhosh, "Computer Fundamentals and Programming in C", Second
5. Edition, Oxford University Press, 2013.
6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition,Pearson Education, 2013.

WEB RESOURCES

- https://onlinecourses.nptel.ac.in/noc22_cs40/preview
- https://archive.nptel.ac.in/courses/106/105/106105171

COURSE OUTCOMES

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

CO1: Develop simple applications in C using basic constructs
CO 2: Design and implement applications using arrays and strings.
CO3: Develop and implement modular applications in C using functions.
CO4: Develop applications in C using structures and pointers.
CO5: Design applications using sequential and random access file processing.

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24UHS202	TAMILS AND TECHNOLOGY (Common to All Branches)	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES

- Appreciate weaving and ceramic technology.
- Learn the design and construction technology of ancient times.
- Understand the engineering principles of manufacturing technology.
- Introduce the methods of irrigation and agricultural technology.
- Learn the scientific tamil and tamil computing.

UNIT I	WEAVING AND CERAMIC TECHNOLOGY	3

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

UNIT II	DESIGN AND CONSTRUCTION TECHNOLOGY	3

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

UNIT III	MANUFACTURING TECHNOLOGY	3

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

UNIT IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	3

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

UNIT V	SCIENTIFIC TAMIL & TAMIL COMPUTING	3

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

L:15	T: 00	P: 00	Total : 15 Periods

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TIRUPUR -638 660, Tamilnadu.

24UHS202	தமிழரும் தொழில்நுட்பமும் (Common to All Branches)	L	T	P	C
		1	0	0	1

அலகு I	தெசவு மற்றும்பானைத்ததொழில்நுட்பம	3
சங்க காலத்தில் நெசவுத்தொழில்- பானைத்தொழில் நுட்பம் கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.		

அலகு II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்	3
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள்&சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் கோவில்களும் மாமல்லபுரச் சிற்பங்களும், சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் நாயக்கர் காலக் கோயில்கள் மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் செட்டிநாட்டு வீடுகள் பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக் கலை.		

அலகு III	உற்பத்தி தொழில்நுட்பம்	3
கப்பல் கட்டும் கலை உலோகவியல் - இரும்பு தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் மணி உருவாக்கும் தொழிற்சாலைகள் மணிகள் துண்டுகள் - கல்மணிகள், கண்ணாடி சுடுமண் மணிகள் சங்கு மணிகள் எலும்புத் தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்		

அலகு IV	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்	3
அணை, ஏரி, குளங்கள், மதகு - சோழர் காலக் குமுழித் தூம்பின் முக்கியத்துவம் கால்நடை பராமரிப்பு காலநடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் முத்து மற்றும் முத்துக்குளித்தல் -பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.		

அலகு V	அறிவியல் தமிழ் மற்றும் கணித்தமிழ்	3
அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்கள் மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத்திட்டம்		

L:15	T: 00	P: 00	Total : 15 Periods

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TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - கே .கே .பிள்ளை (வெளியீடு: தழிழ்நாடு பாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ் -முனைவர்இல .சுந்தரம்.(விகடன்பிரசுரம்).
3. கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரைநாகரிகம்(தொல்லியல்துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The classical Period (Dr.S.Singaravelu) (Publishid by: International institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.k.D.Thirunavukkarasu) (Published by:Institute of Tamil Studies).
8. The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: Institute of Tamil Studies).
9. Keeladi – Sangam City Civilization on the banks of banks of river Vaigai' (Jointly Published by: Department of archaeology & Tamil Nadu Text book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (published by: The Author).
11. Porunai Civilization (jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilzation Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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24UECI221	DIGITAL PRINCIPLES AND DESIGN (For B.E CSE, B.Tech AI&DS, B.Tech IT)	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES

- To learn basic number systems, logic gates, and methods to simplify Boolean expressions..
- To understand and design combinational circuits like adders, multiplexers, decoders, and comparators.
- To study flip-flops, registers, counters, and how to design synchronous sequential circuits.
- To learn how asynchronous circuits work and how to design them without hazards.
- To understand memory devices and programmable logic components used in digital systems.

UNIT-I	DIGITAL FUNDAMENTALS	9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Min terms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization.

UNIT-II	COMBINATIONAL LOGIC	9

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder— Binary Multiplier — Magnitude Comparator — Decoders — Encoders — Multiplexers — Parity Generator and Checker, HDL models of Combinational circuit.

UNIT-III	SYNCHRONOUS SEQUENTIAL LOGIC	9

Sequential Circuits — Storage Elements: Latches, Flip-Flops — Analysis of Clocked Sequential Circuits — State Reduction and Assignment — Design Procedure — Registers and Counters — HDL Models of Sequential Circuits.

UNIT-IV	ASYNCHRONOUS SEQUENTIAL LOGIC	9

Analysis and Design of Asynchronous Sequential Circuits — Reduction of State and Flow Tables — Race-free State Assignment — Hazards.

UNIT-V	MEMORY AND PROGRAMMABLE LOGIC	9

RAM — Memory Decoding — Error Detection and Correction — ROM — Programmable Logic Array — Programmable Array Logic — Sequential Programmable Devices.

HEAD OF THE DEPARTMENT
Department of ECE
Jai Shriram Engineering College
Avinashipalayam, Tirupur-638660.

PRACTICAL EXERCISES:

1. Design of adders and subtractors & code converters.
2. Design of Multiplexers & Demultiplexers.
3. Design of Encoders and Decoders.
4. Design of Magnitude Comparators
5. Design and implementation of counters using flip-flops
6. Design and implementation of shift registers.

LIST OF EQUIPMENTS
1. Digital Trainer kit 2. Logic gates (AND, OR, XOR) 3. IC chips (e.g., 7400 series) 4. Flip flops IC

L:45	T: 0	P: 30	Total : 75 Periods

TEXT BOOKS
1. M. Morris Mano and Michael D. Ciletti, "Digital Design", 5th Edition, Pearson, 2014. 2. Charles H.Roth. "Fundamentals of Logic Design",6th Edition, Thomson Learning, 2013
REFERENCES
1. Thomas L.Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011. 2. S.Salivahanan and S.Arivazhagan, "Digital Electronics",1st Edition, Vikas Publishing House Private Ltd, 2012. 3. Soumitra Kumar Mandal, "Digital Electronics", Mc Graw Hill Education Private Limited, 2016.
WEB RESOURCES
• https://www.youtube.com/watch?v=HiWwf3jZpqI&list=PL4bg5GylbV_G1gI45Rd8NN9LxX_b9B9n_&index=2
COURSE OUTCOMES At the end of the course students should be able to CO1: Use Boolean algebra and simplification procedures relevant to digital logic CO2: Design various combinational digital circuits using logic gates CO3: Analyse and design synchronous sequential circuits CO4: Analyse and design asynchronous sequential circuits. CO5: Build logic gates and use programmable devices.

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24UGE211	ENGINEERING FUNDAMENTALS LABORATORY (Common to All branches)	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.
- Wiring various electrical joints in common household electrical wire work.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.
- Understand the component parts of computer systems.
- Understand the master programming constructs, and develop, test, and debug programs.
- Identify and analyze problems, and design and implement solutions.

Part – A (Civil and Mechanical) (Students will be offered any 10 experiments)	
1.	Land documents reading and understanding
2.	Material identification and testing as per BIS & NBC
3.	Basic surveying and land area measurement
4.	Water analysis
5.	Basic vasthu
6.	Make a Butt/Lap/Tee joint of MS plate using Arc welding and also make Lap joint using riveting
7.	Prepare T/L/Lap joint from the given wooden work piece and make a Box /Tray out of plywood using modern power tools
8.	Perform the simple turning, drilling, tapping using lathe
9.	Demonstration of basic foundry operations
10.	Making a square tray using sheet metal
11.	Study of various metals and alloys
12.	Hands on training to use measuring instruments
13.	Study of 3-D printer / Robotics architecture / Mechatronics system
Part – B (Electrical and Electronics)	
Students will be offered any 07 experiments	
1.	Study of electrical switches, fuses, indicators, circuit breakers, contactors and relays
2.	Wiring circuit for fluorescent lamp and Stair case wiring
3.	Wiring Circuit of ceiling fan
4.	Measurement of Earth Resistance

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5.	House wiring with energy meter, RCCB and ELCB
6.	Study of electronic components resistor, diode, transistors etc.,
7.	Soldering and Assembly of Simple Circuits and trouble shooting
8.	Measuring devices (multimeter, voltmeter, ammeter, megger)
	Part- C (Computer Technologies)
1.	Office automation tools - Word processing
2.	Office automation tools –Spread sheets
3.	Office automation tools - Presentation preparation
4.	Network topology configuration
5.	Network crimping & I/O outlet termination
6.	Types of operating systems and installation

L:0	T:0	P:60	Total:60 Periods

LIST OF EQUIPMENTS REQUIRED

Plumbing Equipments

Welding Machine-Set up

Electrical and Electronics Kit

Hardware Requirements

- Standard PC

Software Requirements

- Windows 7 or higher
- Python latest version

COURSE OUTCOMES:

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

CO1: Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.

CO2: Wire various electrical joints in common household electrical wire work.

CO3: Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.

CO4: Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CO5: Evaluate the performance of different types of CPU scheduling algorithm.

CO6: Use different systems calls for writing application programs.

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24UCS211	PROGRAMMING IN C LABORATORY (Common to B. E CSE, B.Tech AI&DS and B.Tech IT)	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

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

S.No.	LIST OF EXERCISES:
1	I/O statements, operators, expressions
2	Decision-making constructs: if-else, goto, switch-case, break-continue
3	Loops: for, while, do-while
4	Arrays: 1D and 2D, Multi-dimensional arrays
5	Strings: operations
6	Functions: call, return, passing parameters by (value, reference), passing arrays to function.
7	Recursion
8	Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers
9	Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.
10	Files: reading and writing, file operations, Sequential Access ,Random Access

L:0	T:0	P:45	Total: 45 PERIODS

LIST OF EQUIPMENTS REQUIRED

HARDWARE REQUIREMENTS

Standard PC

SOFTWARE REQUIREMENTS

1. Windows 7 or higher
2. Dev C++

COURSE OUTCOMES:

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

CO1: Demonstrate knowledge on C programming constructs.

CO2: Develop programs in C using basic constructs.

CO3: Develop programs in C using arrays.

CO4: Develop applications in C using strings, pointers, functions.

CO5: Develop applications in C using structures and file processing.

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24UHS211	COMMUNICATION LABORATORY (Common to all Branches)	L	T	P	C
		0	0	4	2

Prerequisites:
• Basic Knowledge in Language usage

COURSE OBJECTIVES:
• To identify varied group discussion skills and apply them to take part in effective discussions in a professional context. • To analyse concepts and problems and make effective presentations explaining them clearly and precisely. • To be able to communicate effectively through formal and informal writing. • To be able to use appropriate language structures to write emails, reports and essays • To give instructions and recommendations that are clear and relevant to the context

UNIT-I	MAKING COMPARISONS	12
Speaking-Role Play Exercises Based on Workplace Contexts, - talking about competition discussing progress toward goals-talking about experiences- talking about events in life-discussing past events-Writing: writing emails (formal & semi-formal).		

UNIT-II	EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING	12
Speaking: discussing news stories-talking about frequency-talking about travel problems discussing travel procedures- talking about travel problems- making arrangements-describing arrangements-discussing plans and decisions- discussing purposes and reasons- understanding common technology terms-Writing: - writing different types of emails.		

UNIT-III	PROBLEM SOLVING	12
Speaking: discussing predictions-describing the climate-discussing forecasts and scenarios-talking about purchasing-discussing advantages and disadvantages- making comparisons-discussing likes and dislikes- discussing feelings about experiences-discussing imaginary scenarios Writing: short essays and reports-formal/semi-formal letters.		

UNIT-IV	REPORTING OF EVENTS AND RESEARCH	12
Speaking: discussing the natural environment-describing systems-describing position and movement- explaining rules - (example- discussing rental arrangements) - understanding technical instructions-Writing: writing instructions-writing a short article.		

UNIT-V	THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY	12
Speaking: describing things relatively-describing clothing-discussing safety issues (making recommendations) talking about electrical devices-describing controlling actions- Writing: job application (Cover letter + Curriculum vitae)-writing recommendations		

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L:0	T:0	P:60	Total: 60 PERIODS

WEB RESOURCES

- https://academicguides.waldenu.edu/writingcenter/grammar/comparisons#:~:text=Adjectives%20and%20adverbs%20can%20be,to%20hedge%20or%20boost%20language.
- https://www.linkedin.com/pulse/causality-expressed-natural-language-text-vivek-khetan
- https://www.sessionlab.com/blog/problem-solving-techniques/

COURSE OUTCOMES

At the end of the course students should be able to

CO1:Speak effectively in group discussions held in formal/semi formal contexts.

CO2:Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions

CO3:Write emails, letters and effective job applications.

CO4:Write critical reports to convey data and information with clarity and precision

CO5:Give appropriate instructions and recommendations for safe execution of tasks

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REGULATIONS 2024

B.E. COMPUTER SCIENCE AND ENGINEERING

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR III SEMESTER

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24UMA302	DISCRETE MATHEMATICS II Year / III Sem (Common to B.E CSE & B.Tech IT & AI&DS Branches)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES

- To extend student's logical and mathematical maturity and ability to deal with abstraction
- To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
- To understand the basic concepts of combinatorics and graph theory.
- To familiarize the applications of algebraic structures.
- To understand the concepts and significance of lattices and Boolean algebra which are widely used in computer science and engineering.

UNIT-I	LOGIC AND PROOFS	9 + 3

Propositional logic – Propositional equivalences - Predicates and quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy (Method of Contradiction and Contra positive).

UNIT-II	COMBINATORICS	9 + 3

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

UNIT-III	GRAPHS	9 + 3

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

UNIT-IV	ALGEBRAIC STRUCTURES	9 + 3

Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields (Basic definitions and examples).

UNIT-V	LATTICES AND BOOLEAN ALGEBRA	9 + 3

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra – Boolean Homomorphism.

L:45	T:15	T: 60 PERIODS

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TEXT BOOKS

1. Rosen. K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.
2. Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES

1. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5 th Edition, Pearson Education Asia, Delhi, 2013.
2. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Have knowledge of the concepts needed to test the logic of a program.

CO2: Have an understanding in identifying structures on many levels.

CO3: Be aware of a class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.

CO4: Be aware of the counting principles.

CO5: Be exposed to concepts and properties of algebraic structures such as groups, rings and fields.

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24UCS301	DATA STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

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

UNIT-I	LISTS	9

Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial ADT – Radix Sort – Multilists

UNIT-II	STACKS AND QUEUES	9

Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions - Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

UNIT-III	TREES	9

Tree ADT – Tree Traversals - Binary Tree ADT – Expression trees – Binary Search Tree ADT – AVL Trees – Priority Queue (Heaps) – Binary Heap-Red black Tree.

UNIT-IV	MULTIWAY SEARCH TREES AND GRAPHS	9

B-Tree – B+ Tree - Graph Definition – Representation of Graphs – Types of Graph - Breadth-first traversal – Depth-first traversal – Bi-connectivity – Euler circuits – Topological Sort – Dijkstra's algorithm – Minimum Spanning Tree – Prim's algorithm – Kruskal's algorithm.

UNIT-V	SEARCHING, SORTING AND HASHING TECHNIQUES	9

Searching – Linear Search – Binary Search - Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort –. Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing –Rehashing – Extendible Hashing

L:45	T:0	P:0	Total: 45 Periods

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TEXT BOOKS

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 2005.
2. Kamthane, Introduction to Data Structures in C, 1st Edition, Pearson Education, 2007.

REFERENCES

1. Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++, 2nd Edition, Pearson Education, 2015.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press, 2022.
3. Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,Data Structures and Algorithms, 1st edition, Pearson, 2002.
4. Kruse, Data Structures and Program Design in C, 2nd Edition, Pearson Education, 2006.

COURSE OUTCOMES

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

CO1: Explain linear and non-linear data structures

CO2: Implement linear and non–linear data structure operations

CO3: Use appropriate linear/non–linear data structure operations for solving a given problem

CO4: Apply appropriate graph algorithms for graph applications

CO5: Analyze the various searching and sorting algorithm.

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24UCS302	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand Object Oriented Programming concepts and basics of Java programming language.
- To know the principles of packages, inheritance and interfaces.
- To develop a java application with exceptions and threads.
- To define the use of I/O streams generics and Collection Framework.
- To design and build Graphical User Interface Application using JAVAFX.

UNIT I	INTRODUCTION TO OOP AND JAVA	9

Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming –Overview of Java – Java Buzzwords – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors-Methods –Access specifiers - Static members- Java Doc comments.

UNIT II	INHERITANCE, PACKAGES AND INTERFACES	9

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces.

UNIT III	EXCEPTION HANDLING AND MULTITHREADING	9

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model– Creating Multiple Threads – Priorities – Synchronization – Inter Thread Communication- Suspending –Resuming, and Stopping Threads –Multithreading a Thread and Wrappers – Auto boxing.

UNIT IV	I/O, GENERICS , AND COLLECTION FRAMEWORK	9

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Basic Collection Framework Overview- Basics of List- Set-Queue- Strings: Basic String class, methods and String Buffer Class.

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UNIT V	JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS	9
JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls – ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane. Menus – Basics – Menu – Menu bars – Menu Item		

L:45	T:0	P:0	Total: 45 Periods

TEXT BOOKS

1. Herbert Schildt, "Java: The Complete Reference", 11 th Edition, McGraw Hill Education, New Delhi, 2019.
2. Herbert Schildt, "Introducing JavaFX 8 Programming", 1 st Edition, McGraw Hill Education, New Delhi, 2015

REFERENCES

1. Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall, 2020

COURSE OUTCOMES

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

CO1: Apply the concepts of classes and objects to solve simple problems

CO2: Develop programs using inheritance, packages and interfaces

CO3: Make use of exception handling mechanisms and multithreaded model to solve real world problems

CO4: Build Java applications with I/O packages, Generics Concepts , Collections and Frameworks

CO5: Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications

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24UCS303	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand the basics and functions of operating systems.
- To understand Processes and Threads
- To analyze Scheduling algorithms and process synchronization and understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To be familiar with I/O management and File systems and the basics of virtual machines and Mobile OS like iOS and Android.

UNIT-I	UNIT I INTRODUCTION	7

Computer System - Elements and organization; Operating System Overview - Objectives and Functions - Evolution of Operating System; Operating System Structures – Operating System Services - User Operating System Interface System Calls – System Programs - Design and Implementation - Structuring methods

UNIT-II	PROCESS MANAGEMENT	11

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication; CPU Scheduling - Scheduling criteria - Scheduling algorithms: Threads - Multithread Models – Threading issues; Process Synchronization - The critical-section problem - Synchronization hardware – Semaphores – Mutex - Classical problems of synchronization - Monitors; Deadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT-III	MEMORY MANAGEMENT	10

Main Memory - Swapping - Contiguous Memory Allocation – Paging - Structure of the Page Table - Segmentation, Segmentation with paging; Virtual Memory - Demand Paging – Copy on Write - Page Replacement - Allocation of Frames –Thrashing.

UNIT-IV	STORAGE MANAGEMENT	10

Mass Storage system – Disk Structure - Disk Scheduling and Management; File-System Interface - File concept - Access methods - Directory Structure - Directory organization - File system mounting - File Sharing and Protection; File System Implementation - File System Structure - Directory implementation - Allocation Methods - Free Space Management; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem.

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UNIT-V	VIRTUAL MACHINES AND MOBILE OS	7

Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS - iOS and Android.

L: 45	T: 0	P: 0	Total: 45 Periods

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2018.
2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 4th Edition, New Delhi, 2016.

REFERENCES

1. Ramaz Elmasri, A. Gil Carrick, David Levine, "Operating Systems – A Spiral Approach", Tata McGraw Hill Edition, 2010.
2. William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition, Prentice Hall, 2018.
3. Achyut S.Godbole, Atul Kahate, "Operating Systems", McGraw Hill Education, 2016.

COURSE OUTCOMES

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

CO1: Analyze various scheduling algorithms and process synchronization

CO2: Explain deadlock, prevention and avoidance algorithms.

CO3: Compare and contrast various memory management schemes

CO4: Explain the functionality of file systems I/O systems, and Virtualization

CO5: Compare iOS and Android Operating Systems

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24UCSI301	FOUNDATIONS OF DATA SCIENCE	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES

- To understand the data science fundamentals and process
- To learn to describe the data for the data science process
- To learn to describe the relationship between data
- To utilize the Python libraries for data wrangling
- To present and interpret data using visualization libraries in Python

UNIT-I	INTRODUCTION	9

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

UNIT-II	DESCRIBING DATA	9

Types of Data - Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores - Convert a raw score to a z score and vice versa

UNIT-III	DESCRIBING RELATIONSHIPS	9

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

UNIT-IV	PYTHON LIBRARIES FOR DATA WRANGLING	9

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

UNIT-V	DATA VISUALIZATION	9

Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional Plotting - Geographic Data with Basemap - Visualization with Seaborn.

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LIST OF EXERCISES

1. Download, install and explore the features of Numpy, SciPy, Jupyter, Statsmodels and Pandas packages.
2. Working with Numpy arrays
3. Working with Pandas data frames
4. Reading data from text files, Excel and the web and exploring various commands for doing Descriptive analytics on the Iris data set.
5. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following:
   a. Uni-variate 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.
6. Apply and explore various plotting functions on UCI data sets.
   a. Normal curves
   b. Density and contour plots
   c. Correlation and scatter plots
   d. Histograms
   e. Three dimensional plotting
7. Visualizing Geographic Data with Basemap

L: 45	T: 0	P: 30	Total: 75 Periods

TEXT BOOKS

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (Unit I)
2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017. (Units II and III)
3. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016. (Units IV and V)

REFERENCES

1. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.

COURSE OUTCOMES

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

CO1: Define the data science process

CO2: Explain different types of data description for data science process

CO3: Describe about relationships between data

CO4: Use the Python Libraries for Data Wrangling

CO5: Apply visualization Libraries in Python to interpret and explore data

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24UCS311	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES
• To demonstrate array implementation of linear data structure algorithms. • To implement the applications using stack Linked list. • To implement Binary search tree and AVL tree algorithms. • To implement the Heap algorithm and Dijkstra's algorithm. • To implement Prim's algorithm, Sorting, Searching and hashing algorithms.

S.No.	LIST OF EXERCISES
1	Array implementation of Stack and Queue ADTs.
2	Implementation of Singly Linked List.
3	Linked list implementation of Stack and Linear Queue ADTs.
4	Implementation of Polynomial Manipulation using Linked list.
5	Implementation of Evaluating Postfix Expressions.
6	Implementation of Binary Search Trees.
7	Implementation of AVL Trees.
8	Implementation of Heaps using Priority Queues.
9	Implement smart city traffic management system. T The city is modeled as a directed, weighted graph, where: • Intersections are nodes. • Road segments between intersections are directed edges. • Edge weights represent the estimated travel time (in minutes) along each road segment, updated in real-time. A driver wants to get from Intersection A (source) to Intersection Z (destination) as quickly as possible. Recommend the fastest route based on the current edge weights.
10	Implementation of Linear Search and Binary Search.
11	Implementation of Insertion Sort, Selection Sort and Merge Sort
12	Implementation of Open Addressing (Linear Probing and Quadratic Probing)

L: 0	P:60	T: 0	Total: 60 Periods

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COURSE OUTCOMES
Upon completion of the course, the students will be able to
CO1: Implement Linear data structure algorithms.
CO2: Implement applications using Stacks and Linked lists.
CO3: Implement Binary Search tree and AVL tree operations.
CO4: Implement graph algorithms
CO5: Analyze the various searching and sorting algorithms.

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24UCS312	OBJECT ORIENTED PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

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

S.No.	LIST OF EXERCISES
1	Write a java program to create a class student with private data members and public methods to implement encapsulation.
2	Develop a java application with an Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club funds. Generate pay slips for the employees with their gross and net salary.
3	Write a program to implement method overloading & overriding concepts.
4	Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named printArea (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea ( ) that prints the area of the given shape.
5	Solve the above problem using an interface.
6	Implement exception handling and creation of user defined exceptions.
7	Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
8	Write a program to perform file operations.
9	Develop applications to demonstrate the features of generics classes.
10	Develop real world problems for event driven Programming.
11	Develop applications using JavaFX controls, layouts and menus.
12	Develop a mini project for any application using Java concepts.

L: 0	P:60	T: 0	Total: 60 Periods

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COURSE OUTCOMES:
On completion of this course, the students will be able to CO1: Design and develop java programs using object oriented programming concepts CO2: Develop simple applications using object oriented concepts such as package, exceptions. CO3: Implement multithreading, and generics concepts CO4: Create GUIs and event driven programming applications for real world problems CO5: Implement and deploy web applications using Java

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24UCS313	OPERATING SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To install windows operating systems and understand the basics of Unix command and shell programming.
- To implement various CPU scheduling algorithms.
- To implement Deadlock Avoidance and Deadlock Detection Algorithms
- To implement Page Replacement Algorithms
- To implement various memory allocation methods and File Allocation Strategies.

LIST OF EXPERIMENTS

1. Illustrate UNIX commands and Shell Programming
2. Process Management using System Calls : Fork, Exec, Getpid, Exit, Wait, Close
3. Write C programs to implement the various CPU Scheduling Algorithms.
4. Illustrate the inter process communication strategy
5. Implement mutual exclusion by Semaphores
6. Write a C program to avoid Deadlock using Banker's Algorithm
7. Write a C program to Implement Deadlock Detection Algorithm
8. Write C program to implement Threading
9. Implement the paging Technique using C program
10. Write C programs to implement the following Memory Allocation Methods
    a. First Fit b. Worst Fit c. Best Fit
12. Develop a memory management module for a multitasking operating system. The system uses virtual memory, and the module needs to handle page faults efficiently by implementing a page replacement algorithm. Assume the system has a physical memory that can hold only 3 pages at a time. A particular process generates the following sequence of page references String: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2
    Implement and show the behaviour of different page replacement algorithms
13. Write C programs to Implement the various File Organization Techniques
14. Write C programs for the implementation of various disk scheduling algorithms

L: 0	T: 0	P: 60	Total: 60 Periods

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COURSE OUTCOMES
At the end of the course students should be able to:
CO1: Define and implement UNIX Commands.
CO2: Compare the performance of various CPU Scheduling Algorithms.
CO3: Compare and contrast various Memory Allocation Methods.
CO4: Define File Organization and File Allocation Strategies.
CO5: Implement various Disk Scheduling Algorithm

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24UCS314	SKILL DEVELOPMENT LABORATORY I	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES

- To introduce the various sensors
- To introduce interfacing interfacing IoT devices with Cloud.
- To build a small low-cost IoT system using Arduino/Raspberry Pi/ open platform.
- To apply the concept of Internet of Things in real world scenario.

S.No.	LIST OF EXERCISES
1	Control LED Lights using Aurdino
2	Study of different types of sensors
3	Ultrasonic Sensor-LED Interface using Arduino
4	Smart Door Locking systems using IoT
5	Log Data using Raspberry PI and upload to the cloud platform
6	Fingerprint Sensor Interfacing using Raspberry Pi
7	QR Code Scanner using Raspberry Pi and OpenCv
8	Crowd size estimation using Raspberry Pi and OpenCv
9	IoT Smart Garage Door Opener using Raspberry Pi and OpenCv
10	IoT based smart parking System using NodeMCU

L: 0	P:30	T: 0	Total: 30 Periods

COURSE OUTCOMES

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

CO1: Explain the various sensors and its usage

CO2: Design IoT applications using Arduino

CO3: Interface IoT devices with cloud platforms

CO4: Design IoT applications Raspberry Pi /open platform

CO5: Design IoT small applications for real world scenarios

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REGULATIONS 2024

B.E. COMPUTER SCIENCE AND ENGINEERING

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR IV SEMESTER

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24UCS401	WEB TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand different Internet Technologies.
- To learn java-specific web services architecture.
- To understand Client and Server side programming.
- To develop web applications using frameworks.

UNIT-I	WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0	11

Web Essentials: Clients, Servers and Communication – The Internet – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations. Bootstrap Framework.

UNIT-II	CLIENT–SIDE PROGRAMMING	8

Java Script: An introduction to JavaScript–JavaScript DOM Model-Exception Handling-Validation Built-in Objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files.

UNIT-III	SERVER-SIDE PROGRAMMING	8

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- DATABASE CONNECTIVITY: JDBC.

UNIT-IV	PHP and XML	9

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions-Form Validation. XML: Basic XML- Document Type Definition- XML Schema, XML Parsers and Validation, XSL.

UNIT-V	INTRODUCTION TO WEB APPLICATIONS FRAMEWORKS	9

Introduction to Angular JS,MVC Architecture, understanding attributes, Expressions and data binding, Conditional Directives, Style Directives, Controllers, Filters, Forms, Routers, Modules, Services; Web Applications Frameworks and Tools – Firebase- Docker-Django-UI & UX.

L:45	T:0	P:0	Total: 45 PERIODS

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TEXT BOOKS

1. Deitel and Deitel and Nieto, Internet and World Wide Web - How to Program, Prentice Hall, 5th Edition, 2014.
2. Jeffrey C and Jackson, Web Technologies A Computer Science Perspective, Pearson Education, 2011.

REFERENCES

1. Stephen Wynkoop and John Burke "Running a Perfect Website", QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.
3. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.
4. UttamK.Roy, "Web Technologies", Oxford University Press, 2011.
5. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, 1st edition, O'Reilly.

COURSE OUTCOMES

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

CO1: Create basic and responsive web pages using HTML5 and CSS3.

CO2: Use JavaScript to add dynamic and interactive features to web pages.

CO3: Develop server-side programs using Servlets and connect them to databases.

CO4: Build simple web applications using PHP and work with XML data.

CO5: Understand and use basic features of modern web frameworks and tools.

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24UCS402	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the fundamentals of data models, relational algebra and SQL
- To represent a database system using ER diagrams and to learn normalization techniques
- To understand the fundamental concepts of transaction, concurrency and recovery processing
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design
- To have an introductory knowledge about the Distributed databases, NOSQL and database Security

UNIT-I	RELATIONAL DATABASES	9

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL

UNIT-II	DATABASE DESIGN	9

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT-III	TRANSACTIONS	9

Transaction Concepts – ACID Properties – Schedules – Serializability – Transaction support in SQL – Need for Concurrency – Concurrency control –Two Phase Locking- Timestamp – Multiversion – Validation and Snapshot isolation– Multiple Granularity locking – Deadlock Handling – Checkpoints - Recovery Concepts –Recovery based on deferred and immediate update.

UNIT-IV	IMPLEMENTATION TECHNIQUES	9

RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for Selection, Sorting and join operations – Query optimization using Heuristics - Cost Estimation.

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UNIT-V	ADVANCED TOPICS	9
Distributed Databases: Architecture, Data Storage, Transaction Processing, Query processing and optimization-NOSQL Databases: Introduction – CAP Theorem – Document Based systems – Key value Stores – Column Based Systems – Graph Databases. Database Security: Security issues – Access control based on privileges – Role Based access control – SQL Injection – Statistical Database security – Flow control – Encryption and Public Key infrastructures – Challenges.		

L:45	T:0	P:0	Total: 45 Periods

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Seventh Edition, McGraw Hill, 2020.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2017

REFERENCES

1. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

COURSE OUTCOMES

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

CO1: Construct SQL Queries using relational algebra

CO2: Design database using ER model and normalize the database

CO3: Construct queries to handle transaction processing and maintain consistency of the database

CO4: Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database

CO5: Appraise how advanced databases differ from Relational Databases and find a suitable database for the given requirement.

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24UCS403	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To critically analyze the efficiency of alternative algorithmic solutions for the same problem
- To illustrate brute force and divide and conquer design techniques.
- To explain dynamic programming and greedy techniques for solving various problems.
- To apply iterative improvement technique to solve optimization problems
- To examine the limitations of algorithmic power and handling it in different problems.

UNIT-I	INTRODUCTION	8

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types–Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and their properties – Empirical analysis - Mathematical analysis of Recursive and Non recursive algorithms - Visualization

UNIT-II	BRUTE FORCE AND DIVIDE AND CONQUER	10

Brute Force – String Matching - Exhaustive Search - Traveling Salesman Problem – Knapsack Problem - Assignment problem. Divide and Conquer Methodology –Multiplication of Large Integers– Closest-Pair and Convex - Hull Problems. Decrease and Conquer: - Topological Sorting – Transform and Conquer: Presorting – Heaps and Heap Sort.

UNIT-III	DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	10

Dynamic programming – Principle of optimality - Coin changing problem – Warshall's and Floyd's algorithms – Optimal Binary Search Trees - Multi stage graph - Knapsack Problem and Memory functions. Greedy Technique – Dijkstra's algorithm - Huffman Trees and codes - 0/1 Knapsack problem-Activity selection problem

UNIT-IV	ITERATIVE IMPROVEMENT	8

The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs- The Stable marriage Problem.

UNIT-V	LIMITATIONS OF ALGORITHM POWER	9

Lower - Bound Arguments - P, NP, NP- Complete and NP Hard Problems. Backtracking – N Queen problem - Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO search - Assignment problem – Knapsack Problem – Traveling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Traveling Salesman problem – Knapsack problem

L: 45	T: 0	P: 0	Total: 45 Periods

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TEXT BOOKS

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms, Third Edition, PearsonEducation, 2012.

REFERENCES

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2019.
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, Third Edition, PHI Learning Private Limited, 2012.
3. S. Sridhar, Design and Analysis of Algorithms, Oxford university press, 2014.
4. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, Data Structures and Algorithms, Pearson Education, Reprint 2006.

COURSE OUTCOMES

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

CO1: Analyze the efficiency of recursive and non-recursive algorithms mathematically

CO2: Analyze the efficiency of brute force, divide and conquer, decrease and conquer, Transform and conquer algorithmic techniques

CO3: Implement and analyze the problems using dynamic programming and greedy algorithmic techniques.

CO4: Solve the problems using iterative improvement techniques for optimization

CO5: Compute the limitations of algorithmic power and solve the problems using backtracking and branch and bound techniques

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24UCS404	THEORY OF COMPUTATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand foundations of computation including automata theory
- To construct models of regular expressions and languages.
- To design context free grammar and push down automata
- To understand Turing machines and their capability
- To understand Undecidability and NP class problems

UNIT-I	AUTOMATA AND REGULAR EXPRESSIONS	9

Need for automata theory - Introduction to formal proof – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA– Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without ε-moves- Conversion of NFA into DFA – Minimization of DFAs.

UNIT-II	REGULAR EXPRESSIONS AND LANGUAGES	9

Regular expression – Regular Languages- Equivalence of Finite Automata and regular expressions– Proving languages to be not regular (Pumping Lemma) – Closure properties of regular languages.

UNIT-III	CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA	9

Types of Grammar - Chomsky's hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees – Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves - Instantaneous descriptions -Languages of pushdown automata – Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG – Deterministic Pushdown Automata.

UNIT-IV	NORMAL FORMS AND TURING MACHINES	9

Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages – Turing Machine : Basic model – definition and representation – Instantaneous Description – Language acceptance by TM – Programming techniques for Turing machines (subroutines).

UNIT-V	UNDECIDABILITY	9

Unsolvable Problems and Computable Functions –PCP-MPCP- Recursive and recursively enumerable languages – Properties - Universal Turing machine -Tractable and Intractable problems P and NP completeness – Kruskal's algorithm – Travelling Salesman Problem- 3-CNF SAT problems.

L: 45	T: 0	P: 0	Total: 45 Periods

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TEXT BOOKS

1. Hopcroft J.E., Motwani R. & Ullman J.D., "Introduction to Automata Theory, Languages andComputations", 3rd Edition, Pearson Education, 2008.
2. John C Martin , "Introduction to Languages and the Theory of Computation", 4th Edition,Tata McGraw Hill, 2011.

REFERENCES

1. Harry R Lewis and Christos H Papadimitriou , "Elements of the Theory of Computation", 2ndEdition, Prentice Hall of India, 2015.
2. Peter Linz, "An Introduction to Formal Language and Automata", 6th Edition, Jones & Bartlett,2016.

COURSE OUTCOMES

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

CO1: Construct automata theory using Finite Automata.

CO2: Write regular expressions for any pattern.

CO3: Design context free grammar and Pushdown Automata.

CO4: Design Turing machine for computational functions.

CO5: Differentiate between decidable and undecidable problems.

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24UCS405	COMPUTER ORGANIZATION AND ARCHITECTURE	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To learn the basic structure and operations of a computer
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit
- To learn the basics of pipelined execution
- To understand parallelism and multi-core processors
- To understand the memory hierarchies, cache memories and virtual memories and learn the different ways of communication with I/O devices

UNIT-I	BASIC STRUCTURE OF COMPUTERS	9

Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – decision making – MIPS Addressing.

UNIT-II	ARITHMETIC FOR COMPUTERS	9

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

UNIT-III	PROCESSOR AND CONTROL UNIT	9

A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT-IV	PARALLELISIM	9

Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

UNIT-V	MEMORY & I/O SYSTEMS	9

Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory, TLB's – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.

L:45	T:0	P:0	Total: 45 Periods

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TEXT BOOKS

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2017.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCES

1. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2008.
2. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
3. V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.

COURSE OUTCOMES

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

CO1: Write the basics structure of computers, operations and instructions.

CO2: Design arithmetic and logic unit.

CO3: Describe pipelined execution and design control unit.

CO4: Explain parallel processing architectures.

CO5: Compare and contrast the various memory systems and I/O communication

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24UADI421	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	L	T	P	C
		3	0	2	4

COURSE OBJECTIVES

- To Study about uninformed and Heuristic search techniques.
- To Learn techniques for reasoning under uncertainty
- To Introduce Machine Learning and supervised learning algorithms
- To Study about ensembling and unsupervised learning algorithms
- To Learn the basics of deep learning using neural networks

UNIT-I	PROBLEM SOLVING	9

Introduction to AI - AI Applications - Problem solving agents – search algorithms – uninformed search strategies – Heuristic search strategies – Local search and optimization problems – adversarial search– constraint satisfaction problems (CSP).

UNIT-II	PROBABILISTIC REASONING	9

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

UNIT-III	SUPERVISED LEARNING	9

Introduction to machine learning – Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Probabilistic discriminative model - Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random forests.

UNIT-IV	ENSEMBLE TECHNIQUES AND UNSUPERVISED LEARNING	9

Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization

UNIT-V	NEURAL NETWORKS	9

Perceptron - Multilayer perceptron, activation functions, network training – gradient descent optimization – stochastic gradient descent, error back propagation, from shallow networks to deep networks –Unit saturation (aka the vanishing gradient problem) – ReLU, hyper parameter tuning, batch normalization, regularization, dropout

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LIST OF EXPERIMENTS

1. Implementation of Uninformed search algorithms (BFS, DFS)
2. Implementation of Informed search algorithms (A*, memory-bounded A*)
3. Implement naïve Bayes models and Bayesian Networks
4. Build Regression models
5. Build decision trees, random forests and SVM models
6. Implement a customer segmentation using clustering algorithms for a retail chain. The marketing team aims to improve its targeting strategy by grouping customers with similar characteristics. prepare a minimal dataset containing information about customers, including the following features: Age, Annual Income (in Rs), Spending Score (a value between 1 and 100 indicating customer engagement).
7. Implement EM for Bayesian networks
8. Build simple NN models

L: 45	T: 0	P: 30	Total: 75 Periods

TEXT BOOKS

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021.
2. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition,

REFERENCES

1. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education,2007
2. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008
3. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006
4. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013(http://nptel.ac.in/)
5. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
6. Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition,1997.
7. Charu C. Aggarwal, "Data Classification Algorithms and Applications", CRC Press, 2014
8. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, "Foundations of Machine Learning", MIT Press, 2012.
9. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016

COURSE OUTCOMES

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

CO1: Use appropriate search algorithms for problem solving

CO2: Apply reasoning under uncertainty

CO3: Build supervised learning models

CO4: Build ensembling and unsupervised models

CO5: Build neural network models

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24UCS411	WEB TECHNOLOGY LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES
• To understand the fundamentals of creating structured and interactive web pages. • To apply client-side scripting techniques for validation and dynamic behavior. • To develop server-side programs using Servlets and JSP. • To implement database-connected web applications using JDBC. • To use XML technologies for data formatting and transformation.

S.No.	LIST OF EXERCISES
1	Create a web page with the following using HTML. • To embed an image map in a web page. • To fix the hot spots. • Show all the related information when the hot spots are clicked.
2	Create a web page with all types of Cascading style sheets.
3	Validate the registration, user login, user profile and payment by credit card pages using JavaScript.
4	Client-Side Scripts for Validating Web Form Controls using DHTML.
5	• Validate the form using PHP regular expression. • PHP stores a form data into database.
6	Installation of Apache Tomcat web server.
7	Write programs in Java using Servlets: • To invoke servlets from HTML forms. • Session Tracking.
8	Write programs in Java to create three-tier applications using JSP and Databases • For conducting on-line examination. • For displaying student mark list. Assume that student information is available in a database which has been stored in a database server
9	Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document.
10	Implement the MVC architecture by creating a simple blog application.
11	Create a To-Do list web app that uses data binding and expressions.
12	Build a simple web application using any web development frameworks.

L: 0	P:60	T: 0	Total: 60 Periods

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COURSE OUTCOMES
Upon completion of the course, the students will be able to CO1: Construct a basic website using HTML and Cascading Style Sheets. CO2: Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms. CO3: Develop server side programs using Servlets and JSP. CO4: Construct simple web pages in PHP and to represent data in XML format. CO5: Develop interactive web applications.

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24UCS412	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To learn and implement important commands in SQL.
- To learn the usage of nested and joint queries.
- To understand functions, procedures and procedural extensions of databases.
- To understand design and implementation of typical database applications.
- To learn the usage of NoSQL database tools

S.No.	LIST OF EXERCISES
1	Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2	Create a set of tables, add foreign key constraints and incorporate referential integrity
3	Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4	Query the database tables and explore sub queries and simple join operations.
5	Write user defined functions and stored procedures in SQL.
6	Execute complex transactions and realize DCL and TCL commands.
7	Write SQL Triggers for insert, delete, and update operations in a database table
8	Create View and index for database tables with a large number
9	Create an XML database and validate it using XML schema.
10	Create Document, column and graph-based data using NOSQL database tools.
11	Design a Library Management System (LMS) for a college library. The library needs to manage books, users and transactions. The library offers various books that users can borrow and return, and there are specific rules for managing book checkouts (e.g., maximum checkout period, fines for late returns, etc.).
12	Case Study using any of the real-life database applications

L: 0	P:60	T: 0	Total: 60 Periods

COURSE OUTCOMES

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

CO1: Create databases with different types of key constraints.

CO2: Construct simple and complex SQL queries using DML and DCL commands.

CO3: Use advanced features such as stored procedures and triggers and incorporate in GUI based application development.

CO4: Create an XML database and validate with meta-data (XML schema).

CO5: reate and manipulate data using NOSQL database.

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24UCS413	ALGORITHMS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES

- To critically analyze the efficiency of alternative algorithmic solutions for the same problem
- To illustrate brute force and divide and conquer design techniques.
- To explain dynamic programming and greedy techniques for solving various problems.
- To apply iterative improvement technique to solve optimization problems
- To examine the limitations of algorithmic power and handling it in different problems.

LIST OF EXPERIMENTS

1. Implement recursive and non-recursive algorithms and study the order of growth from log2n to n!
2. Divide and Conquer - Strassen's Matrix Multiplication
3. Decrease and Conquer - Topological Sorting
4. Transform and Conquer - Heap Sort
5. Dynamic programming - Coin change Problem,
6. Implement Warshall's and Floyd's algorithms
7. Implement Knapsack Problem
8. Develop a system for a smart city. A user wants to drive from Location A to Location F, The city has multiple connected roads with different travel times due to traffic conditions. The model needs to determine the shortest travel time (in minutes) between these points using Dijktra's algorithm.
9. Implement Huffman Trees using greedy technique
10. Iterative improvement - Simplex Method
11. Backtracking – N-Queen problem, Subset Sum Problem
12. Branch and Bound - Assignment problem, Traveling Salesman Problem

L: 0	T: 0	P: 60	Total: 60 Periods

COURSE OUTCOMES

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

CO1: Analyze the efficiency of recursive and non-recursive algorithms mathematically

CO2: Analyze the efficiency of brute force, divide and conquer, decrease and conquer, Transform and conquer algorithmic techniques

CO3: Implement and analyze the problems using dynamic programming and greedy algorithmic techniques.

CO4: Solve the problems using iterative improvement techniques for optimization

CO5: Compute the limitations of algorithmic power and solve the problems using backtracking and branch and bound techniques

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