SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

B.E- Computer Science and Engineering

CURRICULUM and SYLLABI

[For students admitted in 2024-2025]

B.E / B.Tech Regulations 2023

Approved by BOS and Academic Council meetings

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester I under Regulations 2023 (CBCS)
Branch: BE Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
	Theory Courses									
1.	U23ENG101A	Communication Skills in English	2	0	2	0	3	HS	60	TL
2.	U23MAT102A	Linear Algebra and Calculus with MATLAB	3	0	2	0	4	BS	75	TL
3.	U23PHY103B	Engineering Physics	3	0	0	0	3	BS	45	T
4.	U23PPR105	Problem Solving using Python Programming	3	0	0	0	3	ES	45	T
5.	U23BEE106A	Basics of Electrical and Electronics Engineering	3	0	0	0	3	ES	45	T
6.	U23TAM101	தமிழர் மரபு / Heritage of Tamils	1	0	0	0	1	HS	15	T
7.	U23GE101	Basic Aptitude-I	2	0	0	0	0	AC	30	T
	Practical Courses									
8.	U23PHL110	Engineering Physics Laboratory	0	0	2	0	1	BS	30	L
9.	U23PPL112	Python Programming Laboratory	0	0	2	0	1	ES	30	L
10.	U23BEEL113	Basics of Electrical and Electronics Engineering Laboratory	0	0	2	0	1	ES	30	L
						Total Credits	**20**			
	Optional Language Courses**									
11.	U23OL1101	French	1	0	0	0	1	OL	15	T
12.	U23OL1102	German							15	T
13.	U23OL1103	Japanese							15	T
14.	U23OL1104	Korean							15	T
15.	U23OL1105	Hindi							15	T

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

**Students may opt for foreign languages viz., German/French/Japanese/Korean/Hindi with additional one credit (Not accounted for CGPA calculation)

Approved By

Chairperson, Science and Humanities BoS	Chairperson, CSE BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.M.Renuga	Dr. B. Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:-
HOD/Computer Science and Engineering, First Semester B.E. CSE Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester II under Regulations 2023 (CBCS)
Branch: B.E Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	U23ENG201A	Technical English	2	0	0	0	2	HS	30	T
2.	U23MAT202D	Discrete Mathematics	3	1	0	0	4	BS	60	TT
3.	U23CHE204B	Chemistry for Computer Science	3	0	0	0	3	BS	45	T
4.	U23CPR205	Programming in C	3	0	0	0	3	ES	45	T
5.	U23EGR207	Engineering Graphics	3	0	0	0	3	ES	45	T
6.	U23EC203	Digital Principles and System Design	3	0	0	0	3	ES	45	T
7.	U23TAM201	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	1	0	0	0	1	HS	15	T
8.	U23GE201	Basic Aptitude- II	2	0	0	0	0	AC	30	T
Practical courses										
9.	U23CHL211	Chemistry Laboratory	0	0	2	0	1	BS	30	L
10.	U23CPL212	C Programming Laboratory	0	0	2	0	1	ES	30	L
Total Credits							21			
Optional Language Courses**										
11.	U23OL1201	French - II	1	0	0	0	1	OL	15	T
12.	U23OL1202	German - II							15	T
13.	U23OL1203	Japanese - II							15	T
14.	U23OL1204	Korean - II							15	T
15.	U23OL1205	Hindi - II							15	T

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**Students may opt for foreign languages viz., German/French/Japanese/Korean/Hindi with additional one credit (Not accounted for CGPA calculation)

Approved By

Chairperson, Science and Humanities BoS	Chairperson, CSE BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.M.Renuga	Dr B.Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:- HOD/Computer Science and Engineering, Second Semester B.E. CSE Students and Staff, COE

CSE III

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester III under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	U23MAT301D	Probability and Statistics	3	1	0	0	4	BS	60	TT
2.	U23CS301	Data Structures	3	0	0	0	3	PC	45	T
3.	U23CS302	Computer Architecture	3	0	0	0	3	PC	45	T
4.	U23CS303	Object Oriented Programming Using Java	3	0	0	0	3	PC	45	T
5.	U23CS304	Operating Systems	3	0	0	0	3	PC	45	T
6.	U23CS305	Computer and Information Ethics	3	0	0	0	3	PC	45	T
7.	noc25-mg106	**NPTEL**: Design Thinking- A Primer	1	0	0	0	1	ES	15	T
8.	U23GE302	**Audit Course**: Environment and Climate Science	2	0	0	0	0	AC	30	T
Practical courses										
9.	U23CS306	Data Structures Laboratory	0	0	2	0	1	PC	30	L
10.	U23CS307	Object Oriented Programing Using Java Laboratory	0	0	2	0	1	PC	30	L
11.	U23GE301	Soft Skills and Aptitude-1	0	0	2	0	1	EEC	30	L
Total Credits							23			

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Approved By

Chairperson, Computer Science and Engineering BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.B.Sathiyabhama	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/ Computer Science and Engineering, Third Semester B.E. CSE Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester IV under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	U23MAT401B	Numerical Methods	3	1	0	0	4	BS	60	TT
2.	U23CS401	Design and Analysis of Algorithms	3	0	0	0	3	PC	45	T
3.	U23CS402	Software Engineering	3	0	0	0	3	PC	45	T
4.	U23CS403	Database Management Systems	3	0	0	0	3	PC	45	T
5.	U23EC407	Embedded System Design	3	0	0	0	3	ES	45	T
6.	U23GE402	**Audit Course:** Essence of Indian Traditional Knowledge	2	0	0	0	0	AC	30	T
Practical courses										
7.	U23CS404	Software Development Laboratory	0	0	4	0	2	PC	60	L
8.	U23CS405	Database Management Systems Laboratory	0	0	4	0	2	PC	60	L
9.	U23GE401	Soft Skills and Aptitude-II	0	0	2	0	1	EEC	30	L
Total Credits							21			

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Approved By

Chairperson, Computer Science and Engineering BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.B.Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/ Computer Science and Engineering, Fourth Semester B.E. CSE Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester I under Regulations 2023 (CBCS)
Branch: BE Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
	Theory Courses									
1.	U23ENG101A	Communication Skills in English	2	0	2	0	3	HS	60	TL
2.	U23MAT102A	Linear Algebra and Calculus with MATLAB	3	0	2	0	4	BS	75	TL
3.	U23PHY103B	Engineering Physics	3	0	0	0	3	BS	45	T
4.	U23PPR105	Problem Solving using Python Programming	3	0	0	0	3	ES	45	T
5.	U23BEE106A	Basics of Electrical and Electronics Engineering	3	0	0	0	3	ES	45	T
6.	U23TAM101	தமிழர் மரபு / Heritage of Tamils	1	0	0	0	1	HS	15	T
7.	U23GE101	Basic Aptitude-I	2	0	0	0	0	AC	30	T
	Practical Courses									
8.	U23PHL110	Engineering Physics Laboratory	0	0	2	0	1	BS	30	L
9.	U23PPL112	Python Programming Laboratory	0	0	2	0	1	ES	30	L
10.	U23BEEL113	Basics of Electrical and Electronics Engineering Laboratory	0	0	2	0	1	ES	30	L
						Total Credits	**20**			
	Optional Language Courses**									
11.	U23OL1101	French	1	0	0	0	1	OL	15	T
12.	U23OL1102	German							15	T
13.	U23OL1103	Japanese							15	T
14.	U23OL1104	Korean							15	T
15.	U23OL1105	Hindi							15	T

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Approved By

Chairperson, Science and Humanities BoS	Chairperson, CSE BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.M.Renuga	Dr. B. Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:-
HOD/Computer Science and Engineering, First Semester B.E. CSE Students and Staff, COE

U23ENG101A	Communication Skills in English (Common to ADS, AIML, BME, CSD, CSE, CIVIL, ECE, EEE, MCT, FT, IT Branches)	L	T	P	J	C
		2	0	2	0	3

Course Outcomes

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

CO1:	Use grammatical components effectively in both written and spoken communication
CO2:	Develop speaking skills for self-introduction, delivering speeches and technical presentation
CO3:	Demonstrate effective listening skills for academic and professional purposes
CO4:	Write emails and formal letters and build resumes and construct paragraphs
CO5:	Develop speaking skills both in terms of fluency and comprehensibility

Pre-requisite:

- Knowledge and Understanding of Grammar
- Fundamental Language Skills (LSRW)

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	3	3	2	3	3	2	3	2	3
CO2	1	1	1	1	1	3	3	3	3	3	3	3	3	3
CO3	1	2	3	2	2	3	3	2	3	3	3	3	3	3
CO4	1	2	1	2	2	3	3	3	3	3	3	3	3	3
CO5	1	2	2	3	2	3	3	3	3	3	3	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (10) (Theory) CIE test II (10) (Theory) CIE test III (10) (Theory) CIE test IV (10) (Practical) Assignment/seminar/Quiz (5)	Attendance (5) Total CIE: 50 marks Semester End Examination (50) (SEE – Theory (25 marks + Lab (25 marks)	Course end survey

Unit 01: **6 Hours**

- General vocabulary, Parts of Speech, Articles
- Email, fixing an appointment, cancelling appointments, conference details, hotel accommodation, order for equipment, training programme details, paper submission for seminars and conferences
- Paragraph writing – Describing – defining – providing examples or evidences

Unit 02:	6 Hours
• Tenses, Sentence Patterns • Instructions • Letter Writing - calling for quotations, placing orders	
Unit 03:	**6 Hours**
• Prefixes and Suffixes • Cover letter and resume writing	
Unit 04:	**6 Hours**
• Modal verbs, concord • Checklist • Letter Writing - Business communication, complaints, replies to queries from business customers	
Unit 05:	**6 Hours**
• If conditionals • Letter Writing - inviting dignitaries, accepting and declining invitations	

Lab component:

1. Self-introduction, personal information, name, home background, study details, area of interest, hobbies, strengths and weaknesses, projects and paper presentations, likes and dislikes in food, travel, clothes, special features of home town.
2. Mini presentation - Office Arrangements, Facilities, Office Functions, Sales, Purchases, Training Recruitment, Advertising, Applying for financial assistance, applying for a job.
3. Listening - understanding short conversations or monologues, taking down phone messages, orders, notes, etc.
4. Listening – entering information in tabular form
5. Loud Reading

Theory: 30 Hrs	Tutorial: --	Practical: 30 hours-	Project:--	Total Hours: 60 Hrs

TEXT BOOKS

1.	Technical English I & II, Dr. M. Renuga et al. Sonaversity, 2016
2.	**Extensive Reading** 1. She is Dancing Back to Life – A Short Story" 2. The Story of Google – Sara Gilbert, published by Jaico 3. The Story of Amazon.com- Sara Gilbert, published by Jaico

REFERENCES

1.	Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
2.	A Course in Communication Skills, P. Kiranmai Dutt, Geetha Rajeevan, C. L. N. Prakash, published by Cambridge University Press India Pvt. Ltd.

HOD

Dr. M.RENUGA,
Professor & Head,
Department of Humanities & Languages,
Sona College of Technology,
SALEM - 6

B. E. / COMPUTER SCIENCE AND ENGINEERING						
SEMESTER - I	LINEAR ALGEBRA AND CALCULUS WITH MATLAB	L	T	P	J	C
U23MAT102A		3	0	2	0	4

Course Outcomes

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

CO1:	find the rank of the matrix and solve linear system of equations by direct and indirect methods
CO2:	apply the concepts of vector spaces and linear transformations in real world applications
CO3:	apply the concepts of eigenvalues and eigenvectors of a real matrix and their properties to diagonalize the matrix.
CO4:	find the Taylor's series expansion, Jacobians and the maxima and minima of functions of two variables
CO5:	apply the appropriate techniques of multiple integrals to find the area and volume.

Pre-requisites:

- Fundamentals of elementary algebra
- Fundamentals of calculus
- Fundamentals of geometry
- Fundamentals of trigonometry

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		3	2							2	2	2	3
CO2	3	3		3	2							2	2	2	3
CO3	3	3		3	2							2	2	2	3
CO4	3	3		3	2							2	2	2	3
CO5	3	3		3	2							2	2	2	3

Course assessment methods [Theory with laboratory course]

Direct		Indirect
CIE test I (10) (Theory) CIE test II (10) (Theory) CIE test III (10) (Theory) CIE test IV (10) (Practical) Attendance (5) Assignment/Quiz/Seminar (5)	Total CIE: 50 marks Semester End Examination (50) [SEE- Theory (35) + Lab(15) marks]	Course end survey

Unit 01	LINEAR SYSTEM OF EQUATIONS	9 Hours

Rank of a matrix – solution of linear system of equations by matrix method, Gauss elimination, Gauss-Jordan, Gauss-Jacobi and Gauss-Seidel methods.

Unit 02	VECTOR SPACES	9 Hours

Vector space – linear independence and dependence of vectors – basis – dimension – linear transformations (maps) – matrix associated with a linear map – range and kernel of a linear map.

Unit 03	EIGENVALUES AND EIGENVECTORS	9 Hours

Eigenvalues and eigenvectors of real matrices – properties of eigenvalues and eigenvectors – Cayley-Hamilton theorem – diagonalization of real symmetric matrices.

Unit 04	MULTIVARIABLE CALCULUS	9 Hours
Functions of several variables – partial differentiation – total derivative – Jacobians – Taylor's theorem for functions of two variables – maxima and minima of functions of two variables without constraints – constrained maxima and minima by Lagrange's method of undetermined multipliers.		
Unit 05	**MULTIPLE INTEGRALS**	**9 Hours**
Double integrals – change of order of integration – change of variables from Cartesian to polar coordinates – area as double integrals in Cartesian coordinates – triple integrals – volume as triple integrals in Cartesian coordinates.		

	List of MATLAB Programs
1.	Programs based on elementary operations on matrices
2.	Computing the rank of a matrix
3.	Finding eigenvalues and eigenvectors of a matrix
4.	Finding partial derivatives of functions of several variables
5.	Computing stationary points of functions of two variables
6.	Taylors series expansion of functions of two variables
7.	Evaluating double integrals
8.	Finding area as double integrals
9.	Evaluating triple integrals
10.	Finding volume as triple integrals

Theory: 45 Hrs	Tutorial: -	Practical: 30 Hrs	Project:–	Total Hours: 75 Hrs

TEXT BOOKS:

1. T. Veerarajan, "Linear Algebra and Partial Differential Equations", McGraw Hill Publishers, 1st Edition, 2018.
2. T. Veerarajan, "Engineering Mathematics for Semesters I & II", McGraw Hill Publishers, 1st Edition, 2019.
3. W. Yang, Y. K. Choi, K. Jaekwon, M. C. Kim, H. J. Kim and T. Im, "Engineering Mathematics with MATLAB", CRC Press Publishers, 1st Edition, 2017.

REFERENCE BOOKS:

1. S. Lipschutz and M. L. Lipson, "Linear Algebra", McGraw Hill Publishers, 6th Edition, 2018.
2. E. Kreyszig, "Advanced Engineering Mathematics", Wiley Publishers, 10th Edition, Reprint, 2017.
3. C. Prasad and R. Garg, "Advanced Engineering Mathematics", Khanna Publishers, 1st Edition, 2018.
4. B. V. Ramana, "Higher Engineering Mathematics", McGraw Hill Publishers, 29th Reprint, 2017.
5. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, 2018.
6. D. Xu, "Calculus problem solutions with MATLAB", Walter de Gruyter Publishers, 1st Edition, 2020.

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Dr. M. RENUGA,
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SALEM - 636 005.

U23PHY103B	ENGINEERING PHYSICS (Common to CSE, CSD, AIML & ECE)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Analyse the relation between arrangement of atoms and material properties.
CO2:	Discuss the dual nature of matter and radiation and the application of wave nature of particles.
CO3:	Describe the basic components of lasers
CO4:	Differentiate the electrical and thermal conductivity of metals
CO5:	Elucidate the classification and theory of semiconducting materials

Pre-requisite:

Basic knowledge in atomic physics and optics.

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	2	2	-	-	2	-	2	-	3
CO2	3	2	-	-	-	2	2	-	-	2	-	2	-	3
CO3	3	2	-	-	-	2	2	-	-	2	-	2	-	3
CO4	3	2	-	-	-	2	2	-	-	2	-	2	-	3
CO5	3	2	-	-	-	2	2	-	-	2	-	2	-	3

Course Assessment methods

Direct		Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Assignment/Seminar/Quiz (5)	Objectives Test (6) Attendance (5) Total CIE: 40 marks Semester End Examination (60)	Course End Survey

Unit 01: CRYSTAL PHYSICS — **9 Hours**

Importance of crystals - Types of crystals - Basic definitions in crystallography (Lattice -space lattice - unit cell - lattice parameters - basis) - Bravais lattices - Lattice planes and Miller indices - Interplanar distance - d spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Atomic Packing Factor for SC, BCC, FCC and HCP structures - Polymorphism and allotropy - Crystal

imperfections - Point, line and surface defects - Burger vector.	
Unit 02: QUANTUM PHYSICS	**9 Hours**
Limitations of classical theory - Dual nature of matter and radiation - Compton effect - Expression for Compton shift (no derivation) - de Broglie waves - Heisenberg's Uncertainity principle - Schrodinger's time independent and time dependent wave equations - Physical significance of wave function - Energy and wave function of an electron trapped in one dimensional box - Application of wave nature of particles - Electron microscope - Comparison of optical and electron microscope - Scanning electron microscope - Limitations of electron microscope.	
Unit 03: LASERS	**9 Hours**
Energy level - Stimulated absorption - Population inversion - Meta stable state - Spontaneous emission - Stimulated emission - Basic *components* of a laser - Einstein's theory of spontaneous and stimulated emission of radiation - Types of lasers - Solid state laser - Nd:YAG laser - Gas laser - CO_2 laser - Semiconductor laser - Homojunction and hetero junction laser - Holography - Construction and reconstruction of hologram - Application of laser in industry – Cutting, welding and drilling – Medical applications – Lasik.	
Unit 04: CONDUCTING MATERIALS	**9 Hours**
Basic definitions - Classical free electron theory of metals - Expression for electrical conductivity and thermal conductivity - Wiedemann Franz law - Lorentz number - Drawbacks of classical free electron theory - Quantum theory - band theory of solids (qualitative treatment only) - Fermi energy and Fermi distribution function - Effect of temperature on Fermi function - Density of energy states - Carrier concentration in metals.	
Unit 05: SEMICONDUCTING MATERIALS	**9 Hours**
Intrinsic semiconductors - Energy band diagram - Direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors - Fermi level - Variation of Fermi level with temperature - Electrical conductivity - Band gap determination - Extrinsic semiconductors - Carrier concentration in n-type and p-type semiconductors (Qualitative Treatment only) - Variation of Fermi level with temperature and impurity concentration - Hall effect - Determination of Hall coefficient - Applications.	

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

TEXT BOOKS

1. M.N. Avadhanulu, P.G. Kshirsagar , "A Textbook of Engineering Physics", S.Chand & Company Ltd, New Delhi 2014.
2. D. K. Bhattacharya, Poonam Tandon "Engineering Physics", Oxford University Press 2017.

REFERENCES

1. "Engineering Physics", Sonaversity, Sona College of Technology, Salem, Revised Edition 2018.

2.	B. K. Pandey and S. Chaturvedi, "Engineering Physics", Cengage Learning India Pvt. Ltd., Delhi, 2021.
3.	V. Raghavan, "Materials Science and Engineering: A First Course" Prentice Hall India Learning Private Limited, 6th Edison, 2015.
4.	William D. Callister Jr., David G. Rethwisch, "Callister's Materials Science and Engineering", 10th Edition, Global Edition 2019.
5.	R.Wolfson, "Essential University Physics", Volume 1 & 2. Pearson Education (Indian Edition), 2009.

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Dr. M.RENUGA,
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U23PHL110	ENGINEERING PHYSICS LABORATORY (Common to I Year B.E. CSE, CSE (AIML), & CSD)	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1:	Determine the optical, thermal and electrical properties of materials by various physics laboratory equipment.
CO2:	Access, process and analyse scientific information.
CO3:	Solve problems individually and collaboratively.

Pre-requisite: Capable of using Screw gauge, Vernier calliper, Travelling microscope, Spectrometer, able to handle burette.

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		1		1			1					2
CO2	3	2		1		1			1					2
CO3	3	2		1		1			1					2

Course Assessment methods

Direct		Indirect
CIE test I (15)	RTPS (10)	Course end survey
Quiz 1 (5)	Record (10)	
CIE test II (15)	Total CIE:60 marks	
Quiz 2 (5)	Semester End Examination (40 marks)	

LIST OF EXPERIMENTS

1	Determination of the thickness of a thin wire by forming interference fringes using air wedge apparatus.
2	Determination of velocity of ultrasonic waves and compressibility of the given liquid using ultrasonic interferometer.
3	Determination of specific resistance of a given wire using Carey Foster's bridge.
4	Determination of laser wavelength using diode laser.
5	Determination of particle size of lycopodium powder using diode laser.
6	Determination of acceptance angle and numerical aperture of an optical fibre using diode laser.

7	Determination of Wavelength of Mercury spectrum using spectrometer.	
8	Determination of Rigidity Modulus of given wire using Torsion Pendulum.	
9	Determination of coefficient of viscosity of liquid by Poiseuille's method.	
10	Determination of band gap of the given semiconductor diode.	
		TOTAL : 30 HOURS

24.7.2024

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24/7/24

Dr. M. Renuga
BoS - Chairperson,
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U23PPR105	PROBLEM SOLVING USING PYTHON PROGRAMMING (Common to ADS, IT, CSE, CSE(AIML), CSD, CIVIL, BME, ECE, EEE, MECH and MCT Branches)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Develop algorithmic solutions to simple computational problems
CO2:	Write simple Python programs
CO3:	Write programs with the various control statements and handling strings in Python
CO4:	Develop Python programs using functions and files
CO5:	Analyze a problem and use appropriate data structures to solve it.

Pre-requisite: NIL

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	1	1									1
CO2	2	2	3	1	1									1
CO3	2	2	3	1	1									1
CO4	2	2	3	1	1									1
CO5	2	2	3	1	1									1

Course Assessment methods

Direct		Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Assignment/seminar/Quiz (5)	Objectives Test (6) Attendance (5) Total CIE: 40 marks Semester End Examination (60)	Course end survey

Unit 01: ALGORITHMIC PROBLEM SOLVING — **9 Hours**

Need for computer languages, 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).

Unit 02: BASICS OF PYTHON PROGRAMMING — **9 Hours**

Introduction-Python Interpreter-Interactive and script mode -Values and types, variables, operators, expressions, statements, precedence of operators, Multiple assignments, comments, input function, print function, Formatting numbers and strings, implicit/explicit type conversion.

Unit 03: CONTROL STATEMENTS AND STRINGS — **9 Hours**

Conditional (if), alternative (if-else), chained conditional (if-elif-else). Iteration-while, for, infinite loop, break, continue, pass, else. Strings-String slices, immutability, string methods and operations.

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Unit 04: FUNCTIONS, FILES AND MODULES	9 Hours
Functions - Introduction, inbuilt functions, user defined functions, passing parameters - positional arguments, default arguments, keyword arguments, return values, local scope, global scope and recursion. Files -Text files, reading and writing files. Modules – create – import.	
Unit 05: DATA STRUCTURES: LISTS, SETS, TUPLES, DICTIONARIES	**9 Hours**
Lists-creating lists, list operations, list methods, mutability list functions, searching and sorting, Sets-creating sets, set operations. Tuples-Tuple assignment, Operations on Tuples, lists and tuples, Tuple as return value- Dictionaries-operations and methods, Nested Dictionaries, Union Operation.	

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

TEXT BOOKS

1.	Reema Thareja, "Problem Solving and Programming with Python" Oxford University Press, 2nd Edition 2023.

REFERENCES

1.	Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python" Mc-Graw Hill Education, 2018.
2.	Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus" Wiley India Edition, 2013.
3.	Allen Downey, "Think Python: How to Think Like a Computer Scientist" O'Reilly Media, 2nd Edition 2016.
4.	Timothy A. Budd," Exploring Python" Mc-Graw Hill Education (India) Private Ltd., 2015.

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U23PPL112	PYTHON PROGRAMMING LABORATORY (Common to ADS, IT, CSE, CSE(AIML), CSD, CIVIL, BME, ECE, EEE, MECH and MCT Branches)	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1:	Implement the algorithms using basic control structures in Python
CO2:	Develop Python programs to use functions, strings and data structures to solve different types of problems
CO3:	Implement persistent storing information through file operations

Pre-requisite: NIL

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3	2	1								1
CO2	3	3	3	3	2	2								1
CO3	3	3	3	3	2	2								1

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz I- (5) CIE test II (15) Quiz II- (5)	RTPS (10) Record (10) Total CIE: 60 marks Semester End Examination (40 marks)	Course end survey

LIST OF EXPERIMENTS

1. Draw flowchart using any open source software.
2. Implement programs with simple language features.
3. Implement various branching statements in python.
4. Implement various looping statements in python.
5. Develop python programs to perform various string operations like concatenation, slicing, indexing.
6. Implement user defined functions using python.
7. Implement recursion using python.
8. Implement python program to perform operations on file and module.
9. Develop python programs to perform operations on list and tuples.
10. Implement dictionary and set in python.

Theory: --	Tutorial: --	Practical: 30Hrs	Project: --	Total Hours: 30 Hs

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U23BEE106A	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	J	C
		3	0	0	0	3

(Common to CSE,IT and ADS)

Course Outcomes

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

CO1:	Analyse the basic circuit laws and find the DC circuit parameters.
CO2:	Analyse the AC circuits and determine the various parameters of AC circuits.
CO3:	Explain the construction and working principle of Electrical machines and Transformer.
CO4:	Describe the working principles and characteristics of semiconductor devices.
CO5:	Describe the working principles of operational amplifiers and UPS with applications.

Pre-requisite:

Physics

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2		3	2	2	2	3		1	2	3	3
CO2	3	3	2		3	2	2	2	3		1	2	3	3
CO3	2	3	2		2	2	2	2	3		1	2	3	3
CO4	2	3	2		2	2	2	2	3		1	3	3	3
CO5	2	3	2		2	2	2	2	3		1	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (8)	Objectives Test (6)	Course end survey
CIE test II (8)	Attendance (5)	
CIE test III (8)	Total CIE: 40 marks	
Assignment/seminar/Quiz (5)	Semester End Examination (60)	

Unit 01: DC FUNDAMENTALS — **9 Hours**

Electrical components and parameters – Resistance, Conductance – Ohm's law – Kirchhoff's law – Resistors in series and parallel – Comparison of series and parallel circuits – Star-Delta transformation.

Unit 02: AC FUNDAMENTALS — **9 Hours**

AC waveforms – standard terminologies – RMS and average values of Sinusoidal, Triangular and Square waveforms – Form factor, Peak factor – Resistance, Inductance, Capacitance in AC circuits – Impedance – RL, RC, RLC series circuits.

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Unit 03: ELECTRICAL MACHINES	9 Hours
DC Generator: Construction and Working principle - EMF equation, Types and Applications. DC Motor: Working Principle of DC motor, Types and Applications. Single Phase Transformer: Construction, Working principle and Applications.	

Unit 04: SEMICONDUCTOR DEVICES	9 Hours
Introduction to semiconductors – PN junction diode, Zener diode, BJT - Operations of NPN and PNP Transistors – Characteristics of Transistors in CE, CB and CC configuration, SCR, MOSFET, I-V characteristics. Diode Rectifiers: Working principle of half wave rectifier, Full wave rectifier, and Bridge rectifier.	

Unit 05: POWER SUPPLY AND OPERATIONAL AMPLIFIERS	9 Hours
UPS: Components of UPS – Working principle of UPS – Types of UPS - Applications. SMPS - Block diagram- Principle of operation – Applications. Operational Amplifier: Ideal characteristics of Op-Amp – Inverting amplifier, non-Inverting amplifier – Voltage follower – Summing amplifier.	

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

TEXT BOOKS

1. B.L. Theraja, "Fundamentals of Electrical Engineering & Electronics", S. Chand & Co Ltd, 28th Edition 2018
2. J.B. Gupta, "Fundamentals of Electrical and Electronics Engineering", Revised edition 2012, S.K. Kataria & Sons.

REFERENCES

1. Mehta V.K, Rohit Mehta, "Principles of Electrical Engineering & Electronics", S.Chand& Co. Ltd., 2016.
2. D. Roy Choudhury and Shail Jain, "Linear Integrated Circuits", sixth edition, New age international, 2021.
3. S. Padma, C. Santhana Lakshmi, S. Purushotham, "Basic Electrical and Electronics Engineering", Sonaversity, Revised edition 2016.
4. P S Subramaniyam, "Basic concepts of Electrical and Electronics Engineering ", BS Publications, I Edition, 2016.

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U23BEEL113	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	L	T	P	J	C
		0	0	2	0	1

(Common to CSE,IT and ADS)

Course Outcomes

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

CO1:	Apply the basic circuit laws and calculate various parameters of DC and AC circuits.
CO2:	Analyse the performance characteristics of electronic devices, DC Motor and Single Phase transformer.
CO3:	Apply the basic concepts of electrical and electronics for real time problem solving.

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2			3	2		3		3	3	3	3
CO2	2	2	2		3				3		2	3	2	3
CO3	3	2	2		3				3		2	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz I- (5) CIE test II (15) Quiz II- (5)	RTPS (10) Record (10) Total CIE: 60 marks Semester End Examination (40 marks)	Course end survey

LIST OF EXPERIMENTS

1. Verification of Ohm's Law and Kirchhoff's Law.
2. Measurement of power and power factor for RLC series circuit.
3. Characteristics of PN Junction Diode and Zener Diode.
4. Characteristics of BJT in CB and CE Configurations.
5. Characteristics of SCR
6. Characteristics of MOSFET.
7. Measurement of ripple factor for half wave and full wave rectifier circuits.
8. Characteristics of operational amplifier as inverting and non-inverting amplifiers.
9. Load test on shunt motor.
10. Load test on single phase transformer.
11. Line and load regulation of SMPS.

TOTAL: 30 Hours

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U23TAM101	தமிழர் மரபு / Heritage of Tamils	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Describe Tamil Language and Literature
CO2:	Analyse Heritage - Rock Art Paintings To Modern Art – Sculpture
CO3:	Explain Folk and Martial Arts
CO4:	Describe Thinai Concept of Tamils
CO5:	Analyse Contribution of Tamils to Indian National Movement and Indian Culture

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

அலகு 1 : மொழி மற்றும் இலக்கியம்	3 Hours

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி -தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு 2 : மரபு – பாறை ஓவியங்கள் முதல் ஓவியங்கள் வரை – சிற்பக் கலை	3 Hours

நடுகல் முதல் சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை- சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு

அலகு 3: நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்	3 Hours

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோலபாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு 4: தமிழர்களின் திணைக் கோட்பாடுகள்	3 Hours

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் -

சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.				
அலகு 5: இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு				**3 Hours**
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள் கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.				
Theory: 15 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 15 Hrs**

REFERENCES

1	தமிழக வரலாறு – மக்களும் பண்பாடு – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித் தமிழ் - முனைவர் இல.சுந்தரம்.(விகடன் பிரசுரம்).
3	கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4	பொருநை –ஆற்றங்னரை நாகரிகம். (தொல்லியல் துறை 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) (Published by: International Institute of Tamil Studies
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City C ivilization on the 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 Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

HOD

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U23TAM101	தமிழர் மரபு / Heritage of Tamils	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Describe Tamil Language and Literature
CO2:	Analyse Heritage - Rock Art Paintings To Modern Art – Sculpture
CO3:	Explain Folk and Martial Arts
CO4:	Describe Thinai Concept of Tamils
CO5:	Analyse Contribution of Tamils to Indian National Movement and Indian Culture

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01: **LANGUAGE AND LITERATURE**	3 Hours
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 02: **HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**	3 Hours
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 03: FOLK AND MARTIAL ARTS	**3 Hours**
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils	
Unit 04: THINAI CONCEPT OF TAMILS	**3 Hours**
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 05: CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	**3 Hours**
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	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

REFERENCES

1	தமிழக வரலொறு – மக்களும் பண் பொடும் – மக.மக. பிள்மள (தவளியீடு: தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித ் தமிழ் – முமனவர ்இல. சுந்தரம் . (விகடன் பிரசுரம்).

3	கீழடி – மவமக நதிக்கமரயில் ெங்ககொல நகர நொகரிகம் (ததொல்லியல் துமறதவளியீடு)
4	பொருமந – ஆற்றங்கமர நொகரிகம். (ததொல்லியல் துமற தவளியீடு)
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: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City C ivilization on the 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 Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

HOD

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U23GE101	BASIC APTITUDE-1	L	T	P	J	C
		2	0	0	0	0

Course Outcomes

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

CO1:	Solve the problems in Divisibility , Division algorithm ,Successive Division and HCF & LCM. Identify Synonyms and Antonyms.
CO2:	Elucidate the problems in BODMAS rule, Approximation, Surds and Indices, Algebraic Simplification and Square root and Cube root. Choose appropriate Verbal Analogies and edit the given passages.
CO3:	Crack the problems involving Ratio and Proportion, and discuss Proportionality Theorems. Comprehend the given passages for Reading Comprehension activity and answer the questions correctly.
CO4:	Deduce the problems involving Linear equation and Quadratic equation. Demonstrate good vocabulary skill by doing the one word substitution and sentence filler exercise with high degree of accuracy.
CO5:	Interpret the logical reasoning problems from Number series ,Coding and Decoding and Exhibit good expertise in detecting errors in the given sentences.

Pre-requisite:

- Basic English language and Grammar knowledge
- Knowledge in Basic Mathematics

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO 11	PO12
CO1	3	3	3	2	1	1	1	3	3	3	2	3
CO2	3	3	3	2	1	1	1	3	3	3	2	3
CO3	3	3	3	2	1	1	1	3	3	3	2	3
CO4	3	3	3	2	1	1	1	3	3	3	2	3
CO5	3	3	3	2	1	1	1	3	3	3	2	3

Course Assessment methods

Direct		Indirect
CIE test I (30) - Theory CIE test II (30) - Theory CIE test III (40) – Theory	Total CIE: 100 marks Semester End Examination – NIL	Course end survey

Unit 01	6 Hours
Number Properties: Classification of numbers - Divisibility - Division algorithm -Successive Division - HCF and LCM –Problems Verbal Aptitude: Synonyms and b. Antonyms	
Unit 02	**6 Hours**
Simplification: BODMAS Rule - Approximation - Surds and Indices - Algebraic Simplification - Square root and Cube root – Problems Verbal Aptitude: Verbal analogy, Editing passages	
Unit 03	**6 Hours**
Ratio and Proportion : Ratio - Properties of Ratios - Compound Ratio - Coin based problems - Proportion - Proportionality Test - Proportionality Theorems - Inverse Proportion - Variation - Problems Verbal Aptitude: Reading Comprehension	
Unit 04	**6 Hours**
Equations: a. Linear equation: Simultaneous Linear Equations - Consistent System - Inconsistent System - Problems b. Quadratic Equation: Different Ways to Express the Quadratic Equation - Discriminant of the Quadratic Equations - Roots - Nature of the Roots - Relation between roots and coefficient of equation - Formation of a Quadratic Equation – Problems Verbal Aptitude: One word substitution , Sentence filler words	
Unit 05	**6 Hours**
Logical Reasoning : Number series – Coding and Decoding – Problem Verbal Aptitude: Error detection	

Theory: 30 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 30 Hrs

TEXT BOOKS

1. S.Chand and Dr.R.S.Aggarwal, "Quantitative Aptitude for competitive examinations", S Chand and Company Limited 2019.
2. Nishit K.Sinha, "Logical Reasoning and Data Interpretation", Pearson 2021.

15/09/2023

Dr.S.Anita

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U23OL1101	French	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Read French phrases, Spell French phonitis, practice French accents, differentiate French and English sounds
CO2:	Introduce oneself, talk about someone, ask others personal information, identify an object, ask and respond politely in a conversation
CO3:	Read and write a small annoncement, describe about neighbours, write a small portrait
CO4:	Express one's wishes, talk about one's hobbies, ask time, describe one's status of life in a blog, justify a choice, express one's preferences, write a list of needs
CO5:	Suggest to do something, appreciate something, talk about a movie, write a postal card

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01:	**3 Hours**
Hr 2: Alphabets, Basic wishes, self-introduction, basic verbs: avoir and être Hr 4: Nationalities and countries, colors, days & months Hr 6: Definite articles, numbers 0-20, write about one's identification	
Unit 02:	**3 Hours**
Hr 8: Professions, conjugation: 1st group verbs, indefinite articles Hr 10: Preposition of place, identity card, negative sentence Hr 12: Things around us, subjective and ephatitic pronouns, self-introduction online	
Unit 03:	**3 Hours**
Hr 14: Talk about accommodation, conjugation: aller and venir, possessive adjectives Hr 16: Adjective's gender, noun's gender, things in a room, simple prepositions Hr 18: Physical description, speak about accommodation, writing a self-potrait	
Unit 04:	**3 Hours**
Hr 20: Hobbies, conjugation: vouloir, pouvoir and devoir, connected articles Hr 22: Interrogative adjectives, daily activities, time and seasons, pronominal verbs Hr 24: Near future tense, talk about preferences, write a mail	
Unit 05:	**3 Hours**
Hr 26: Outing activities, conjugation: faire and sortir, demonstrative adjectives Hr 28: Adverbs of frequency, family members, past tenses (passé composé and imparfait) Hr 30: French arts, talk about a film, and write a postal card	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

TEXT BOOKS

1.	The course faculty will provide relevant audios, videos, handouts and notes
2.	Books : Saison (Méthode de français, cachier d'activités)
3.	Reference books : La conjugaison, Dondon, Echo

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U23OL1102	German	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Use common, everyday expressions to greet others and introduce themselves.
CO2:	Construct simple sentences /questions.
CO3:	Initiate and sustain basic conversation based on family, professions,
CO4:	Hobbies and food.
CO5:	Identify differences in using nouns based on gender.

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01:	**3 Hours**
• Greeting and taking leave, introducing oneself, introducing others	
Unit 02:	**3 Hours**
• Alphabets, spelling, numbers	
Unit 03:	**3 Hours**
• Age, Telephone/mobile numbers, Month, Date, Time	
Unit 04:	**3 Hours**
• Languages, Family, Asking/giving information about family members	
Unit 05:	**3 Hours**
• Hobbies, Professions	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

TEXT BOOKS

1.	Netzwerk A1

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U23OL1103	Japanese	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Use words and phrases of greeting in Japanese, write the letters of the alphabet, identify names of objects and do a self-introduction using short and simple sentences
CO2:	Demonstrate the use of time-related words and verb conjunctions and make light conversation asking for directions and answering questions
CO3:	Use different kinds of verbs through the day and those used for giving things, and demonstrate the use of adjectives
CO4:	Express liking for the Japanese language, describe the locations of different things and demonstrate counting in Japanese
CO5:	Make comparisons of stated things, express a willingness to go to Japan and use 'Te-form' verbs

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01:	**3 Hours**
Hr 1-2: Greeting words and phrases; the Japanese alphabet: 104 Hiragana and 104 Katakana letters Hr 3-4: Identifying words from pictures or objects shown Hr 5-6: Self-introduction	
Unit 02:	**3 Hours**
Hr 7-8: Asking for directions when shopping Hr 9-10: Time words and Verb Conjugations Hr 11-12: Making light conversation	
Unit 03:	**3 Hours**
Hr 13-14: Expressions to use verbs from morning to night Hr 15-16: Verbs used for giving things Hr 17-18: Adjectives	
Unit 04:	**3 Hours**
Hr 19-20: Ways to show liking for the Japanese language Hr 21-22: Describing the location of things (or where things are) Hr 23-24: Japanese numbers and counting	
Unit 05:	**3 Hours**
Hr 25-26: Making comparisons Hr 27-28: Expressions wishing for something, like 'I want to go to Japan …!' Hr 29-30: Using 'Te-form' Verb	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

TEXT BOOKS

1.	The course faculty will provide handouts / notes / course material.
2.	Books on Basic Japanese language available in the college library.

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U23OL1104	Korean	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Use single vowels and consonants syllable structure.
CO2:	Greet others and introduce themselves.
CO3:	Identify time , date and week
CO4:	Explain location and places
CO5:	Construct simple sentences / questions.

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01: Hangeul	3 Hours
Single Vowels & Consonants Syllable Structure Tense Consonants Aspirated Consonants Double Vowels Final Consonants Double Final Consonants Liaison	
Unit 02: Introduction	3 Hours
Greetings Talking about names Self-introduction Introducing my family members	
Unit 03: Time and Date	**3 Hours**
Talking about location Talking about dates and days of the week Talking about doing something in the past	
Unit 04: Location and Places	**3 Hours**
Talking about location Talking about doing something at a location Talking about directions	
Unit 05: Future	**3 Hours**
Talking about doing something in the future Talking about plans for the future Talking about hope for the future	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

REFERENCES

1	Vitamin Korean - 1

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U23OL1105	Hindi	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Write स्वर(अ - अः), व्यंजन(क - श्र)
CO2:	Identify and write बारहखडी(क - श्रः)
CO3:	Coin 2,3&4 letters words
CO4:	Read and frame sentences (grammar, verb, noun, pronoun, adjective, etc…)
CO5:	Communicate effectively using tenses (with Continuous)

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01: स्वर (अ - अः), व्यंजन (क - श्र)	3 Hours
Hindi letters learning Letters identification Reading Writing Letters pronunciation	
Unit 02: बारहखडी (क - श्रः)	3 Hours
Hindi letters learning Letters identification Reading Writing Letters pronunciation	
Unit 03: 2,3 & 4 letters words	**3 Hours**
Words making Words meaning Reading & Writing	
Unit 04 : Grammar, (Verb, noun, pronoun, adjective, etc…)	**3 Hours**
Words meaning Reading & Writing Sentence framing	
Unit 05 : Tenses (with Continuous)	**3 Hours**
Talking about school Talking about family, friends Talking about doing something in the past, present, future Translation	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

REFERENCES

1	Diploma in Hindi (department of higher education, Delhi)

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Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester II under Regulations 2023 (CBCS)
Branch: B.E Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	U23ENG201A	Technical English	2	0	0	0	2	HS	30	T
2.	U23MAT202D	Discrete Mathematics	3	1	0	0	4	BS	60	TT
3.	U23CHE204B	Chemistry for Computer Science	3	0	0	0	3	BS	45	T
4.	U23CPR205	Programming in C	3	0	0	0	3	ES	45	T
5.	U23EGR207	Engineering Graphics	3	0	0	0	3	ES	45	T
6.	U23EC203	Digital Principles and System Design	3	0	0	0	3	ES	45	T
7.	U23TAM201	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	1	0	0	0	1	HS	15	T
8.	U23GE201	Basic Aptitude- II	2	0	0	0	0	AC	30	T
Practical courses										
9.	U23CHL211	Chemistry Laboratory	0	0	2	0	1	BS	30	L
10.	U23CPL212	C Programming Laboratory	0	0	2	0	1	ES	30	L
Total Credits							21			
Optional Language Courses**										
11.	U23OL1201	French - II	1	0	0	0	1	OL	15	T
12.	U23OL1202	German - II							15	T
13.	U23OL1203	Japanese - II							15	T
14.	U23OL1204	Korean - II							15	T
15.	U23OL1205	Hindi - II							15	T

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory,TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

**Students may opt for foreign languages viz., German/French/Japanese/Korean/Hindi with additional one credit (Not accounted for CGPA calculation)

Approved By

Chairperson, Science and Humanities BoS	Chairperson, CSE BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.M.Renuga	Dr B.Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:- HOD/Computer Science and Engineering, Second Semester B.E. CSE Students and Staff, COE

U23ENG201A	Technical English (Common to ADS, AIML, BME, CSD, CSE, CIVIL, ECE, EEE, MCT, FT, IT, EXE, EFE Branches)	L	T	P	J	C
		2	0	0	0	2

Course Outcomes

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

CO1:	Frame sentences correctly, both in written and spoken forms of language with accuracy and fluency
CO2:	Develop effective reading skills and reinforce language skills required for using grammar and building vocabulary
CO3:	Organise ideas and supporting arguments logically
CO4:	Develop skills for writing conversations, proposals, reports and transcoding
CO5:	Read for understanding and interpreting information and to utilise information accordingly

Pre-requisite:

- Knowledge and Understanding of Grammar
- Fundamental Language Skills (LSRW)

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	3	2	3	3	3	3	3	3	3	3	3
CO2	2	2	2	3	2	3	3	3	3	3	3	3	3	3
CO3	3	2	2	3	2	3	3	3	3	3	3	3	3	3
CO4	3	3	2	3	2	3	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	3	3	3	3	3	3	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7) Assignment/seminar/Quiz (5)	Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: **6 Hours**

- Comparative adjectives
- Recommendations
- Guided writing – Conversation in workplace context
- Reading passages for specific information transfer

Unit 02:	6 Hours
• Prepositions, adverbs • Note making • Reading passage with multiple choice questions, reading for gist and reading for specific information	
Unit 03:	**6 Hours**
• Collocations, direct and indirect speech • Memo • Proposal: establishing a lab, introducing a subject in the curriculum, training programme for students • Short reading passage: gap-filling exercise related to grammar	
Unit 04:	**6 Hours**
• Cause and effect • Technical report writing – feasibility report, accident report, survey report • Short reading passages for sentence matching exercises, picking out specific information in a short text	
Unit 05:	**6 Hours**
• Active, passive and impersonal passive voices • Transcoding – bar chart, pie chart, tabular column, graph, flow chart	

Theory: 30 Hrs	Tutorial: --	Practical: -	Project:--	Total Hours: 30 Hrs

TEXT BOOKS

1.	Technical English I & II, Dr. M. Renuga et al. Sonaversity, 2016
2.	**Extensive Reading** 1. Who Moved my Cheese? – Spencer Johnson-G. P. Putnam's Sons 2. Discover the Diamond in You – Arindham Chaudhari – Vikas Publishing House Pvt. Ltd.

REFERENCES

1.	Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
2.	A Course in Communication Skills, P. Kiranmai Dutt, Geetha Rajeevan, C. L. N. Prakash, published by Cambridge University Press India Pvt. Ltd.

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SEMESTER - II	DISCRETE MATHEMATICS (Common to CSE, CSD and CSE (AIML))	L	T	P	J	C
U23MAT202D		3	1	0	0	4

Course Outcomes

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

CO1:	check the validity of the arguments in the field of data base and artificial intelligence using the rules of logic.
CO2:	apply the concept of logical theory to validate the correctness of software specifications.
CO3:	analyze and simplify the digital (logic) circuits using the concept of relations.
CO4:	apply the concept of various types of functions in the field of sorting algorithm, parallel computing and image processing.
CO5:	apply the concepts of group theory in the field of coding theory and cryptography.

Pre-requisites:

- Fundamentals of elementary algebra
- Fundamentals of calculus
- Fundamentals of geometry

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2							2		2	3
CO2	3	3	3	3	2							2		2	3
CO3	3	3	3	3	2							2		2	3
CO4	3	3	3	3	2							2		2	3
CO5	3	3	3	3	2							2		2	3

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01 PROPOSITIONAL CALCULUS **12 Hours**

Proposition (statement) – Simple (atomic / primitive) and Compound propositions – Logical connectives / operators (negation, conjunction, disjunction, negation of compound propositions, conditional and bi conditional propositions, converse, contra positive and inverse) – Truth tables – Tautology and contradiction – Logical equivalences and implications (consequences) – De Morgan's laws – Normal forms – Principal conjunctive and disjunctive normal forms – Rules of inference – Arguments – Validity of arguments by truth table technique and rules of inference – Methods of proof (direct and indirect).

Unit 02	PREDICATE CALCULUS	12 Hours
Predicates – Propositional (Statement) function – Quantifiers (Universal and Existential quantifiers) – Variables – Free and bound variables – Scope of the formula — Negation – Logical equivalences and implications for quantified statements – Theory of inference – Rules of universal specification and generalization – Rules of existential specification and generalization - Validity of arguments.		
Unit 03	**RELATIONS**	**12 Hours**
Relations – domain and range of a relation - Types of relations (reflexive, symmetric, transitive, antisymmetric irreflexive relation) and their properties – Relation matrix – Graph of a relation - Partition of a set - Equivalence relations – Equivalence Classes – Quotient set – Partial order relation - Poset – Hasse diagram.		
Unit 04	**FUNCTIONS**	**12 Hours**
Functions – Classification of functions (algebraic and transcendental) – Types of functions (injective, surjective and bijective) – Composition of functions and its properties (statement only) – Inverse functions – Characteristic function of a set and its properties (with proof) - Permutation functions.		
Unit 05	**GROUPS AND GROUP CODES**	**12 Hours**
Algebraic structures – Groups – Cyclic groups – Subgroups – Group homomorphism – Normal subgroups and Cosets – Lagrange's theorem — Codes and group codes – Basic notions of error detection and error correction.		

Theory: 45 Hours	Tutorial: 15 Hours	Practical: -	Project: -	Total Hours: 60 Hours

TEXT BOOK:

1.	T. Veerarajan, "Discrete Mathematics", McGraw Hill Publishers, 1st Edition, 21st Reprint, 2015.

REFERENCE BOOKS:

1.	J. P. Trembly and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill Publishers, 1st Edition, 2017.
2.	K. H. Rosen, "Discrete Mathematics and Its Applications", McGraw Hill Publishers, 8th Edition, 2019.
3.	B. Kolman, R. C. Busby and S. C. Ross, "Discrete Mathematical Structures", Pearson Publishers, 6th Edition, 2006.

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BoS Date: 08. 07. 2023	HoD / Mathematics

U23CHE204B	CHEMISTRY FOR COMPUTER SCIENCE	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Understand the principle, applications of electrochemistry and types of corrosion.
CO2:	Summarize the working principle and applications of energy storage devices.
CO3:	Analyze the types of polymers, polymerization reactions, polymerization techniques and fabrication methods of polymers for engineering applications.
CO4:	Discuss the principle, advantages and applications of organic electronic materials in electronic devices.
CO5:	Analyze the need of e-waste management and disposal methods across the globe.

Pre-requisite:

Basic knowledge on the concepts of organic, inorganic and physical chemistry.

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2					2						3	3
CO2	2	2					2						2	3
CO3	3	2					2						3	3
CO4	3	3					2						3	3
CO5	3	3					3						3	3

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: ELECTROCHEMISTRY AND CORROSION — **9 Hours**

Introduction – basic terminologies - electrode potential – Nernst Equation – derivation and problems based on single electrode potential calculation – reference electrodes – standard hydrogen electrode – saturated calomel electrode – Ion selective electrode – glass electrode – measurement of pH – electrochemical series – significance – electrolytic and electrochemical cells – EMF – measurement of emf – potentiometric titrations (redox – Fe^{2+} vs dichromate) – conductometric titrations (acid-base – HCl vs NaOH) – Corrosion – types – dry and wet corrosion – corrosion control methods of iron sheets by galvanizing and tinning.

Unit 02: CHEMISTRY OF ENERGY STORAGE DEVICES	9 Hours
Reversible and irreversible Cells – Batteries - types of batteries – battery characteristics-voltage-current-capacity-electricity storage density-power-discharge rate-cycle life-energy efficiency and shelf Life – Fabrication and working of alkaline battery-Lead-acid battery-Ni-Cd-Lithium ion batteries and Solar cells – Fuel Cells – Hydrogen-Oxygen fuel cell – Nano batteries- construction-working-advantages and applications.	
Unit 03: POLYMER CHEMISTRY	**9 Hours**
Introduction to Polymers – classification of polymers - functionality – tacticity, degree of polymersation, glass transition temperature in polymers - types of polymerization-addition-condensation and copolymerization – free radical mechanism of addition polymerization – techniques of polymerization-bulk and solution only – Plastics – moulding constituents of plastic – moulding of plastics into articles-Injection, Compression and Blow moulding – Thermoplastic and Thermosetting Resins – Conducting polymers – classification – mechanism of conducting polymers – Applications of conducting polymers.	
Unit 04: CHEMISTRY OF ORGANIC ELECTRONIC MATERIALS	**9 Hours**
Organic semiconducting materials – working principle and advantages over inorganic semiconducting materials - p-type and n-type organic semiconducting materials - Pentacene Fullerenes-C-60 – Organic dielectric material-definition-working principle and examples - Polystyrene – PMMA – Organic light emitting polymer – structure-properties and applications of Polythiopene – Organic Light Emitting Diodes (OLEDs) - construction-working principle and applications – Organic transistors- construction-working principle and applications.	
Unit 05: E-WASTE MANAGEMENT	**9 Hours**
Introduction-E-Waste – definition – sources of e-waste– hazardous substances in e-waste – effects of E-waste on environment and human health- need for E-waste management– E-waste handling rules - salient features of Indian E-waste management rule, 'Rule 2022' - waste minimization techniques for managing E-waste – extraction of gold and copper from printed circuit boards (PCBs) – recycling of E-waste - extraction of tin metal in tin/lead solder dross - disposal treatment methods of E - waste – global Scenario of E-waste – E-waste in India.	

Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project:0	Total Hours: 45 Hrs

TEXT BOOKS

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi , 17th Edition, 2018.
2. Wiley Editorial Board, "Wiley Engineering Chemistry", 2nd Edition, Wiley India Pvt.Ltd, New Delhi, Reprint 2019.

REFERENCES

1. Gowariker V.R. , Viswanathan N.V. and Jayadev Sreedhar, "Polymer Science", New Age International P (Ltd.,), Chennai, 2006.
2. Stergios Logothetidis "Handbook of Flexible Organic Electronics Materials - Manufacturing and

	Applications", WoodHead publishing., 1st edition, London, 2015. .
3.	Sam-Shajing Sun, Larry R. Dalton "Introduction to Organic Electronic and Optoelectronic Materials and Devices", CRC press., 2nd edition, London, 2017.
4.	Majeti Narasimha Var Prasad, Meththika Vithanage, Anwesha Borthakur, "Handbook of Electronic Waste Management", 1st edition - November 21, 2019.

27.1.2025

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Dr. M. Renuga
BoS - Chairperson
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Professor & Head,
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U23CHL211	CHEMISTRY LABORATORY (Common to CSE, CSE (AIML), & CSD branches)	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1:	Analyze the amount of hydrochloric acid in a given solution by pH metry and amount of hydrochloric acid and acetic acid by conductometric titration.
CO2:	Estimate the amount of copper from discarded PCBs, determine the amount of ferrous ion in a given solution by potentiometer and determine the molecular weight of a polymer.
CO3:	Estimate the amount of hardness, alkalinity present in house hold water by volumetric method, estimation of chromium by permanganometry and estimation of iron content in water by spectrophotometry.

Pre-requisite:

Capable of handling burette, pipette, beaker, conical flask and standard measuring flask.

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		1		1	1		1					2
CO2	3	2		1		1	2		1					2
CO3	3	2		1		1	2		1					2

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz 1 (5) CIE test II (15) Quiz 2 (5)	RTPS (10) Record (10) Total CIE: **60 marks** Semester End Examination: **40 marks**	Course end survey

LIST OF EXPERIMENTS

1	Estimation of HCl acid by pH metry.
2	Estimation of HCl by conductometry. (HCl vs NaOH)

3	Estimation of mixture of acids by conductometry. (HCl + CH_3COOH vs NaOH)	
4	Estimation of ferrous ion by potentiometric titration.	
5	Estimation of copper content from discarded PCBs by EDTA method.	
6	Determination of molecular weight of a polymer by viscosity measurements.	
7	Estimation of chromium prepared from electroplating sludge by Permanganometry.	
8	Estimation of hardness of water sample by EDTA method.	
9	Estimation of alkalinity of water sample by indicator method.	
10	Estimation of iron content in water by spectrophotometry.	
		TOTAL : 30 HOURS

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Dr. C. Shanthi
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27.1.25

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U23CPR205	PROGRAMMING IN C (Common to ADS,IT,CSE,CSE(AIML),CSD,ECE,EFE and EXE Branches)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Write simple C programs using console input and output functions
CO2:	Write C programs using arrays, decision making and looping statements
CO3:	Design and develop simple application using functions and pointers.
CO4:	Design and develop real-time applications using structures and unions
CO5:	Design and develop real-time applications using file operation

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	2	2	2	-	2	-	2	2	3	3	2	2
CO2	2	2	3	2	2	1	-	2	-	2	2	3	2	2	2
CO3	2	3	3	2	2	1	-	2	-	2	2	3	3	2	2
CO4	2	3	3	2	2	1	-	2	-	2	1	3	3	2	2
CO5	2	3	3	2	2	2	-	2	-	2	2	3	3	2	2

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: C PROGRAMMING BASICS — **9 Hours**

Structure of a C program - C Character set, Identifies and Keywords, Data Types, Declarations, Expressions, Statements and Symbolic constants, Operators – Arithmetic Operators – Unary operators – Relational and Logical Operators – Assignment operators – Conditional operators. Unformatted and formatted Input/Output functions, pre-processor directives and storage classes.

Unit 02: CONTROL STATEMENTS, ARRAYS AND STRING — **9 Hours**

Conditional statements, Unconditional statements, branching and looping statements - Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

Unit 03: FUNCTIONS AND POINTERS — **9 Hours**

Function – Library functions and user-defined functions – Function prototypes and function definitions – Call by value – Call by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and

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arrays – Pointers and Functions - Dynamic memory Allocation - Example Programs.					
Unit 04: STRUCTURES AND UNIONS					**9 Hours**
Need for structure data type – structure definition – Structure declaration – Structure within a structure – Passing structures to functions – Array of structures – Pointers to structures – Union - Programs using structures and Unions					
Unit 05: FILE MANIPULATIONS					**9 Hours**
Files-File operations- Binary files and text files – Types of File processing-Sequential access -Random Access File - Command line arguments.					
Theory: 45 Hrs	**Tutorial: 0**	**Practical: 0**	**Project:0**		**Total Hours: 45 Hrs**

	TEXT BOOKS
1.	Deitel and Deitel, "C How to Program", Pearson Education, New Delhi, 2011.
2.	Yashavant P. Kanetkar. "Let Us C", BPB Publications, 14th edition, 2016.
	REFERENCES
1.	Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006.
2.	Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
3.	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
4.	E. Balagurusamy, "Programming in ANSI C", seventh edition, Tata McGraw Hill, 2016.

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U23CPL212	C PROGRAMMING LABORATORY (Common to ADS,IT,CSE,CSE(AIML),CSD,ECE,EFE and EXE Branches)	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1	Design and develop simple programs using branching, looping statements
CO2:	Develop programs using functions, arrays, structures and string handling
CO3:	Write programs using pointers and dynamic memory allocation and file handling

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	2	2	2	-	-	-	-	-	-	1	2	2
CO2	2	2	3	2	2	1	-	-	-	-	-	-	1	2	2
CO3	2	3	3	2	2	1	-	-	-	-	-	-	1	2	2

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz 1- (5) CIE test II (15) Quiz 2- (5)	RTPS (10) Record (10) Total CIE: **60 marks** Semester End Examination: **40 marks**	Course end survey

List of Experiments:

1. Programs using Input, Output and assignment statements.
2. Programs using Branching statements
3. Programs using Looping statements
4. Programs using Functions
5. Programs using Arrays
6. Programs using Structures
7. Programs using Strings
8. Programs using Pointers (both data pointers and function pointers)
9. Programs using dynamic memory allocation
10. Programs using Recursion
11. Programs using Files

Theory: 0	Tutorial: 0	Practical: 30Hrs	Project:0	Total Hours: 30 Hrs

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U23EGR207	ENGINEERING GRAPHICS (Common to ADS, IT, BME, CSE, ECE, and FT branches)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Construct –Ellipse, Parabola, Hyperbola, Cycloids and Involutes.
CO2:	Draw the projection of Point, Line and Plane surfaces.
CO3:	Draw the projection of simple solids by rotating object method.
CO4:	Develop the section of simple solids and lateral surface of truncated solids.
CO5:	Draw the isometric view to orthographic projection.

Pre-requisite: Nil

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	1							3		2			1	
CO2					3			2		2		2		2
CO3					3			2		2		2	1	2
CO4					3			2		2		2	1	2
CO5			2					2		2		2	1	

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

CONCEPTS AND CONVENTIONS - (Not for Examination). **9 Hours**

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

Unit 01: PLANE CURVES - (Manual drafting).

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction

of cycloid – construction of Involute of circle – Drawing of tangents and normal to the above curves.	
Unit 02: PROJECTION OF POINTS, LINES AND PLANE SURFACES (CAD software). Orthographic projection- principles-principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes -Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to one of the principal plane by rotating object method.	**9 Hours**
Unit 03: PROJECTION OF SOLIDS (CAD software). Projection of simple solids - prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.	**9 Hours**
Unit 04: PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES. (CAD software). Section of solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – (obtaining true shape of section is not required). Development of lateral surfaces of truncated solids – Prisms, pyramids cylinders and cones.	**9 Hours**
Unit 05: ISOMETRIC TO ORTHOGRAPHICS PROJECTION- (Manual drafting). Representation of three dimensional objects – General Principles - Need for importance of multiple views – First angle projection – layout of views – Conversion of isometric view to orthographic views. Practicing three dimensional modelling of simple objects using CAD Software **(Not for examination)**	**9 Hours**

Theory: 45 Hrs	Tutorial: –	Practical: –	Project:–	Total Hours: 45 Hrs

TEXT BOOKS

1.	Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2.	Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3.	Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015
4.	P.Suresh., "Engineering Graphics and Drawing", Sonaversity, Sona College of Technology, Salem, Revised edition, 2012.

REFERENCES	
1.	BasantAgarwal and Agarwal C.M.,"Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2.	Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27thEdition, 2017.
3.	Luzzader, Warren.J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4.	Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5.	Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6.	Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

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U23EC203	DIGITAL PRINCIPLES AND SYSTEM DESIGN (COMMON TO B.E CSE,AIML,CSD)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Explain number systems, logic gates and simplify Boolean expressions
CO2:	Design of combinational logic circuits
CO3:	Design of sequential logic circuits
CO4:	Design and implement shift registers and counters.
CO5:	Implementation of combinational circuits using Programmable Logic Devices

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	2	2	1	1		2	3	3	3
CO2	3	3	3	3	3	2	2	1	1		2	3	3	3
CO3	3	3	3	3	3	2	2	1	1		2	3	3	3
CO4	3	3	3	3	3	2	2	1	1		2	3	3	3
CO5	3	3	3	3	3	2	2	1	1		2	3	3	3

Course Assessment methods

27/1/25

Direct			Indirect
CIE test I	(9)	Assignment/seminar/Quiz (5)	Course end survey
CIE test II	(9)	Total CIE: 40 marks	
CIE test III	(10)	Semester End Examination: 60 marks	
Objectives Test	(7)		

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Unit 01: BOOLEAN ALGEBRA AND LOGIC GATES — 9 Hours

Review of Number systems – Boolean Algebra – Boolean postulates and theorems- Digital Logic Gates - NAND and NOR Implementation –SOP and POS - Simplification of Boolean functions using K-Map Method – Four Variable K-map – POS Simplification – Don't Care Conditions – Quine McCluskey method.

Unit 02: COMBINATIONAL LOGIC CIRCUITS — 9 Hours

Design of Half and Full Adders, Half and Full Subtractors – Parallel Adders and Subtractors – BCD Adder – Code converters: BCD to XS-3, XS-3 to BCD - Magnitude Comparator – Decoders – Encoders – Multiplexers – Demultiplexers - Design of ALU using adders - Introduction to Verilog HDL - Verilog HDL for 2 – bit adder – 2:1 multiplexer.	
Unit 03: SEQUENTIAL LOGIC CIRCUITS	**9 Hours**
Flip-Flops – SR – D- JK-T– Master Slave JK Flip-Flop – Conversion of Flip Flops – Design of Clocked Sequential Circuits – State Diagram – State Table – State Reduction and Assignment.	
Unit 04: REGISTERS AND COUNTERS	**9 Hours**
Registers – Shift Registers – SISO – SIPO – PIPO — Synchronous Counters – Up-down Binary Counter – Ring Counter – Johnson Counters – Asynchronous Counters – Asynchronous Design Procedure – Race Free State Assignment – Hazards	
Unit 05: MEMORY AND PROGRAMMABLE LOGIC	**9 Hours**
Classification of memories: RAM - Static and Dynamic RAM, ROM - PROM, EPROM, EEPROM - Design of Memory using flip-flops -Implementation of combinational logic using PROM - Programmable Logic Array – Programmable Array Logic.	

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

TEXT BOOKS

1.	M. Morris Mano and Michael D. Ciletti – *'Digital Design with an Introduction to the Verilog HDL'*, 6th Edition, Pearson Education, 2018.
2.	S. Salivahanan and S. Arivazhagan, *"Digital Circuits And Design"*, Oxford University Press, Fifth edition, 2018.

REFERENCES

1.	A.Anandkumar, 'Fundamentals of digital circuits, 4th Edition, Prentice Hall India, Paper back'2016.
2.	John F Wakerly – *'Digital Design Principles and Practices'*, 4th Edition, Prentice Hall India, 2008.

27/1/25

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U23TAM201	தமிழரும் தொழில்நுட்பமும்	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Describe the weaving and ceramic technology
CO2:	Explain the design and construction technology
CO3:	Analyse the manufacturing technology
CO4:	Describe the agriculture and irrigation technology
CO5:	Explain the Scientific Tamil and Tamil Computing

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01: WEAVING AND CERAMIC TECHNOLOGY — **3 Hours**

அலகு I நெசவு மற்றும் பானைத் தொழில்நுட்பம்: 3

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் பாண்டங்களில் கீறல் குறியீடுகள்.

Unit 02: DESIGN AND CONSTRUCTION TECHNOLOGY — **3 Hours**

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு– சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - 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.

Unit 03: MANUFACTURING TECHNOLOGY — **3 Hours**

அலகு III உற்பத்தித் தொழில் நுட்பம்: 3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

Unit 04: AGRICULTURE AND IRRIGATION TECHNOLOGY — **3 Hours**

அலகு IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்: 3

அணை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

Unit 05: SCIENTIFIC TAMIL & TAMIL COMPUTING — **3 Hours**

அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்: 3

அறிவியல் தமிழின் வளர்ச்சி -கணித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

TEXT BOOKS	
1.	தமிழக வரலாறு –மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித் தமிழ் –முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்). கீழடி –வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு) பொருநை –ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
REFERENCES	
3.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
4.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
5.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
6.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
7.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
8.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
9.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10	Journey of Civilization Indus to Vaigai (R.Ramakrishna) (Published by: RMRL) – Reference Book.

HOD

Dr. M.RENUGA,
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Sona College of Technology,
SALEM - 636 005.

U23TAM201	TAMILS AND TECHNOLOGY	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Describe the weaving and ceramic technology
CO2:	Explain the design and construction technology
CO3:	Analyse the manufacturing technology
CO4:	Describe the agriculture and irrigation technology
CO5:	Explain the Scientific Tamil and Tamil Computing

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01: WEAVING AND CERAMIC TECHNOLOGY — **3 Hours**

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

Unit 02: DESIGN AND CONSTRUCTION TECHNOLOGY — **3 Hours**

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)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

Unit 03: MANUFACTURING TECHNOLOGY — **3 Hours**

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins 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 inSilappathikaram.

Unit 04: AGRICULTURE AND IRRIGATION TECHNOLOGY — **3 Hours**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu 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 05: SCIENTIFIC TAMIL & TAMIL COMPUTING — **3 Hours**

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

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

TEXT BOOKS

1. தமிழக வரலாறு –மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் –முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
   கீழடி –வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
   பொருநை –ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

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

HOD

Dr. M.RENUGA,
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LEM - 6 005.

U23GE201	BASIC APTITUDE-II (Common to All Departments)	L	T	P	J	C
		2	0	0	0	0

Course Outcomes

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

CO1:	Solve the problems in Percentage, Conversion of Percentage to Ratio and Ratio into Percentage and work on verbal aptitude questions
CO2:	Elucidate the problems in Profit and loss and percentage of profit and loss. Choose appropriate sentence fillers and Idioms and phrase
CO3:	Crack the problems involving Geometry, Area, Perimeter/Circumference, Surface area and Volume. Comprehend the given passages for Reading Comprehension activity and answer the questions correctly.
CO4:	Deduce the problems involving Trigonometry and exhibit good expertise in detecting errors in the given sentences.
CO5:	Interpret the problems on Ages & logarithm and work on logical reasoning and demonstrate good vocabulary skill by spotting errors.

Pre-requisite:

- Basic English language and Grammar knowledge
- Knowledge in Basic Mathematics

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO 11	PO12
CO1	3	3	3	2	1	1	1	3	3	3	2	3
CO2	3	3	3	2	1	1	1	3	3	3	2	3
CO3	3	3	3	2	1	1	1	3	3	3	2	3
CO4	3	3	3	2	1	1	1	3	3	3	2	3
CO5	3	3	3	2	1	1	1	3	3	3	2	3

Course Assessment methods

Direct		Indirect
CIE test I (30) - Theory CIE test II (30) - Theory CIE test III (40) – Theory	Total CIE: 100 marks Semester End Examination – NIL	Course end survey

Unit 01	6 Hours
Percentage: Conversion of a Percentage into a Fraction – Conversion of a Percentage into a Ratio – Conversion of a Ratio into a Percentage - Percentage Change – Successive percentage – Problems **Verbal Aptitude:** Jumbled sentences & Reconstructions of sentences (PQRS)	
Unit 02	**6 Hours**
Profit Loss: Types of prices – Profit – Loss – Percentage of Profit and Loss - Common Gain or Loss – Selling Price and Cost Price Equality – Successive Profit and Loss – Problems **Verbal Aptitude:** Sentence fillers two words & Idioms and phrase	
Unit 03	**6 Hours**
Geometry: Angles – Complementary and Supplementary angles – Lines – Triangle – Types of triangles – Properties of Triangles – Problems **Area, Perimeter / Circumference:** Triangles - Rectangles and Squares – Parallelogram, Rhombus and Trapezium – Circles – Problems **Surface area, curved surface area & Volume:** Cuboid – Cube – Right circular cylinder – Right circular cone – Sphere – Hemisphere– Problems **Verbal Aptitude:** Reading comprehension.	
Unit 04	**6 Hours**
Trigonometry: Value of Trigonometry ratios for particular values – Sign of Trigonometrical ratios – Trigonometrical ratios for sum or difference of angles Problems **Verbal Aptitude:** Spotting errors	
Unit 05	**6 Hours**
Averages – Problems on ages – Logarithm **- Logical Reasoning:** Alpha Series – Venn diagram – Problems **Verbal Aptitude**: Writing captions for given pictures.	

Theory: 30 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 30 Hrs

TEXT BOOKS

1.	S.Chand and Dr.R.S.Aggarwal, "Quantitative Aptitude for competitive examinations", S Chand and Company Limited 2019.
2.	Nishit K.Sinha, "Logical Reasoning and Data Interpretation", Pearson 2021.

6/02/2024

Dr.S.Anita
Professor & Head
Department of Training

Dr. S. ANITA
Professor and Head
Department of Training,
SONA COLLEGE OF TECHNOLOGY,
SALEM-636 005.

U23OL1201	French - II	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Accept and refuse of an invitation, give some instruction of do's and don'ts, converse in commercial centres, write an invitation
CO2:	Describe a city, locate a place in a city, ask further details, describe one's hometown
CO3:	Talk about things around us, recite a past event, identify sign boards, express agree and disagree, express obligation and prohibition, sell an object in online
CO4:	Talk about one's goals, express one's feelings, write a list of things to do, express an opinion, talk about weather, draft a mail response
CO5:	Express one's interest and wish, describe a pet animal, express one's aversions, encourage others, write to ask for a help, narrate a past event, write a biography

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01:	**3 Hours**
Hr 2: City shopping and services, conjugation: payer, manger and acheter, negative sentence Hr 4: Imperative sentence, food and beverages, utensils, cutleries, corckeries Hr 6: Quantitative articles, quantities, pronoun 'en', express appreciation, write an invitation	
Unit 02:	**3 Hours**
Hr 8: City and localities, Conjugation: prendre, adjectives of place, pronoun 'y' Hr 10: Transport, leisure activities, preposition of place, degrees of comparison Hr 12: Asking information about a new place, describe a city	
Unit 03:	**3 Hours**
Hr 14: Things in a store, conjugation : faire, imparfait 2, passé composé Hr 16: Things in a repairing shop, computer, relative pronouns: que and qui Hr 18: Imperative negative, express obligation and interdiction, online sale and response	
Unit 04:	**3 Hours**
Hr 20: Professions, conjugation: croire, voir, recent past tense Hr 22: Traveling formalities, expressing about health condition, future tense Hr 24: Pronoun COD, talk about weather condition, write about one's plans and projections	
Unit 05:	**3 Hours**
Hr 26: Citizenship and solidarity, conjugation: connaitre and savoir, depuis vs pendant Hr 28: Imparfait vs passé composé, nature and environment, indirect pronouns COI Hr 30: Animals, conditional, talk on supporting others, write a biography	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

TEXT BOOKS

1.	The course faculty will provide relevant audios, videos, handouts and notes.
2.	Books : Saison (Méthode de français, cachier d'activités)
3.	Reference books : La conjugaison, Dondon, Echo

13/2/24.

HOD

Dr. M.RENUGA,
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Sona College of Technology,
SALEM - 6.

U23OL1202	German - II	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Use grammatical expressions appropriately in day-to-day conversation.
CO2:	Make them frame simple sentences /questions.
CO3:	Accentuate to start and sustain basic conversation
CO4:	Helps them articulate thoughts in German
CO5:	Identify the different forms of the verb

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01:	**3 Hours**
Nominative/accusative case, adjectives	
Unit 02:	**3 Hours**
Modes of transportation, orientation, giving/understanding simple directions	
Unit 03:	**3 Hours**
• Food and beverages, Modal verbs, Separable verbs	
Unit 04:	**3 Hours**
• Simple sentences using modal / separable verbs	
Unit 05:	**3 Hours**
• Articles of clothing	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

TEXT BOOKS

1. Netzwerk A1

HOD 13/2/24

Dr. M.RENUGA,
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SALEM - 636 :

U23OL1203	Japanese - II	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Use verbs in polite conversation or for dissuasion and describe two different activities
CO2:	Demonstrate the application of causative verbs and those that express ability or possibility, and describe experiences
CO3:	Use plain-style expressions, those that state opinions, and verbs and adjectives that go with nouns
CO4:	Express sentences that use 'when' and 'if' and those that describe how services are given and received
CO5:	Read 126 letters of Kanji, and demonstrate adequate knowledge of the lessons learnt in Levels I and II to pass the Japanese Language Proficiency Test (JLPT) for the N5 Level

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01:	**3 Hours**
Hr 1-2: Words and verbs expressing requests / Kanji 1-10 Hr 3-4: Asking for permission; making statements to prohibit something / Kanji 11-20 Hr 5-6: Describing two activities / Kanji 21-30	
Unit 02:	**3 Hours**
Hr 7-8: Verbs that express 'I have to ...' / Kanji 31-40 Hr 9-10: Verbs which express ability or possibility / Kanji 41-50 Hr 11-12: Describing experience / Kanji 51-60	
Unit 03:	**3 Hours**
Hr 13-14: Plain-style expressions / Kanji 61-70 Hr 15-16: Expressions like 'I think that ...' / Kanji 71-80 Hr 17-18: Qualifying nouns with verbs and adjectives / Kanji 81-90	
Unit 04:	**3 Hours**
Hr 19-20: Expressions using 'When ...' / Kanji 91-100 Hr 21-22: Describing the giving and receiving of services / Kanji 101-110 Hr 23-24: Expressions using 'If ...' / Kanji 111-126	
Unit 05:	**3 Hours**
Hr 25-26: Preparing for JLPT N5 Hr 27-28: Preparing for JLPT N5 Hr 29-30: Preparing for JLPT N5	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

TEXT BOOKS

1.	The course faculty will provide handouts / notes / course material.
2.	Books on Basic Japanese language available in the college library.

13/4/24

HOD

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SALEM - 636 005.

U23OL1204	Korean - II	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Identify time
CO2:	Identify the date and days of the week
CO3:	Explain location and places
CO4:	Explain destination
CO5:	Construct simple sentences / questions.

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01: Time	3 Hours
Talking about time	
Unit 02: Date	3 Hours
Talking about dates and days of the week Talking about doing something in the past	
Unit 03: Location	**3 Hours**
Talking about location Talking about doing something at a location	
Unit 04: Direction	**3 Hours**
Talking about directions	
Unit 05: Future	**3 Hours**
Talking about doing something in the future Talking about plans for the future Talking about hope for the future	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

REFERENCES

1	Vitamin Korean - 1

13/2/24.

HOD

Dr. M.RENUGA,
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Sona College of Technology,
SALEM - 635 005.

U23OL1205	Hindi - II	L	T	P	J	C
		1	0	0	0	1

Course Outcomes

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

CO1:	Write Tenses and Self – Introduction
CO2:	Write Hindi numbers & sentence Translations
CO3:	Read and Write comprehension question & days of the week
CO4:	Read and frame sentences (Story) & part of the body
CO5:	Communicate effectively using tenses (Conversation)

Course Assessment methods

Direct		Indirect
CIE test I (30) CIE test II (30) CIE test III (40)	Total CIE: 100 marks Semester End Examination: NIL	Course end survey

Unit 01: Tenses and Self – Introduction	3 Hours
Learning Hindi pronunciation Speaking based on Tenses (Present, past & future) Reading Writing	
Unit 02: Hindi Numbers & Sentence Translations	3 Hours
Reading Writing Letters pronunciation Meanings learning	
Unit 03: Comprehension question & Days of the week	**3 Hours**
Reading & analysing the meaning Learning	
Unit 04 : Story and Part of the body	**3 Hours**
Words meaning Reading & Writing Sentence framing	
Unit 05 : Conversation and Colours name	**3 Hours**
Conversation between a boy and Doctor Coersation between Taxi driver and Passenger	

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs

REFERENCES

1	Diploma in Hindi (department of higher education, Delhi)
2	Hindi Prachara sabha exam books (Prathamic and Madhyama)

HOD

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Sona College of Technology,
SALEM - 636 005.

CSE III

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester III under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	U23MAT301D	Probability and Statistics	3	1	0	0	4	BS	60	TT
2.	U23CS301	Data Structures	3	0	0	0	3	PC	45	T
3.	U23CS302	Computer Architecture	3	0	0	0	3	PC	45	T
4.	U23CS303	Object Oriented Programming Using Java	3	0	0	0	3	PC	45	T
5.	U23CS304	Operating Systems	3	0	0	0	3	PC	45	T
6.	U23CS305	Computer and Information Ethics	3	0	0	0	3	PC	45	T
7.	noc25-mg106	**NPTEL**: Design Thinking- A Primer	1	0	0	0	1	ES	15	T
8.	U23GE302	**Audit Course**: Environment and Climate Science	2	0	0	0	0	AC	30	T
Practical courses										
9.	U23CS306	Data Structures Laboratory	0	0	2	0	1	PC	30	L
10.	U23CS307	Object Oriented Programing Using Java Laboratory	0	0	2	0	1	PC	30	L
11.	U23GE301	Soft Skills and Aptitude-1	0	0	2	0	1	EEC	30	L
Total Credits							23			

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project, P- Project.

Approved By

Chairperson, Computer Science and Engineering BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.B.Sathiyabhama	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/ Computer Science and Engineering, Third Semester B.E. CSE Students and Staff, COE

III -CSE

SEMESTER – III	PROBABILITY AND STATISTICS	L	T	P	J	C
U23MAT301D	(CSE / BME / EXE / MECH)	3	1	0	0	4

COURSE OUTCOMES

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

1.	apply the concepts of measures of central tendency, dispersion to the given data and analyze the results.
2.	compute simple and partial correlation coefficients and analyse regression equations for estimation and prediction purposes.
3.	apply the concepts of random variables and their properties to generate the moments.
4.	fit the suitable distribution and its properties to the real world problems and interpret the results.
5.	apply the concepts of joint probability distribution and its properties to find the covariance.

Pre-requisites:

- Fundamentals of elementary algebra
- Fundamentals of calculus
- Fundamentals of trigonometry
- Fundamentals of geometry

CO / PO, PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3 (CSE)
CO1	3	3	3	3	3							2	2		2
CO2	3	3	3	3	3							2	2		2
CO3	3	3	3	3	3							2	2		2
CO4	3	3	3	3	3							2	2		2
CO5	3	3	3	3	3							2	2		2

COURSE ASSESSMENT METHODS

DIRECT		INDIRECT
CIE test I (9)	Assignment/seminar/Quiz (5)	Course end survey
CIE test II (9)	Total CIE: 40 marks	
CIE test III (10)	Semester End Examination: 60 marks	
Objective Test (7)		

UNIT – I	MEASURES OF CENTRAL TENDENCY AND DISPERSION	12

Measures of central tendency (simple arithmetic mean, median, mode) – Quartiles – Measures of dispersion - Absolute and relative measures (range, inter-quartile range, quartile deviation, mean deviation about mean, standard deviation, coefficient of variation).

UNIT – II	CORRELATION AND REGRESSION	12

Simple and rank correlations – Multiple and partial correlations – Linear regression – Relation between simple correlation and regression - Curve fitting (straight line and parabola).

UNIT – III	ONE DIMENSIONAL RANDOM VARIABLE	12

One dimensional random variable – Discrete random variable – Distribution function of the discrete random variable – Probability mass function - Properties – Continuous random variable – Distribution function of the continuous random variable - Probability density function – Properties – Moments – Mathematical expectations – Moment generating function and its properties.

UNIT – IV	THEORETICAL DISTRIBUTIONS	12

Discrete distributions – Binomial distribution – Additive property, moment generating function, mean, variance and standard deviation of binomial distribution – Poisson distribution - Additive property, moment generating function, mean, variance and standard deviation of Poisson distribution – Poisson distribution as limiting form of binomial distribution (Statement only) – Geometric distribution - Memoryless property, moment generating function, mean, variance and standard deviation of Geometric distribution – Continuous distributions - Uniform distribution - Moment generating function, mean, variance and standard deviation of Uniform distribution - Exponential distribution - Memoryless property, moment generating function, mean, variance and standard deviation of exponential distribution - Normal distribution - Additive property, moment generating function, mean, variance and standard deviation of normal distribution (without derivation) – Normal distribution as limiting form of binomial distribution (Statement only) – Problems based on real time applications in discrete and continuous distributions.

UNIT – V	TWO DIMENSIONAL RANDOM VARIABLES	12

Two dimensional discrete random variables – Joint probability distribution of discrete random variables – Marginal and conditional probability distributions – Two dimensional continuous random variables – Joint probability density function – Joint probability distribution function for continuous two dimensional random variables - Marginal and conditional density functions – Covariance – Correlation.

Theory: **45 Hours**	Tutorial: **15 Hours**	Practical: --	Project: --	Total: **60 Hours**

TEXT BOOKS:

1. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publishers, 11th Edition, Reprint, 2019.
2. T. Veerarajan, "Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks", McGraw Hill Publishers, 4th Edition, 7th Reprint, 2018.

REFERENCE BOOKS:

1. R. A. Johnson and C. B. Gupta, "Miller and Freund's, Probability and Statistics for Engineers", Pearson Publishers, 9th Edition, 2018.
2. S. Ross, "A First Course in Probability", Pearson Publishers, 9th Edition, 2019.
3. S. P. Gupta, "Statistical Methods", Sultan Chand and Sons Publishers, 46th Edition, 2023.

14/06/2025

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B. E / B. TECH REGULATIONS 2023	HEAD OF THE DEPARTMENT OF MATHEMATICS
S&H BoS DATE: 22 – 06 – 2024	

U23CS301	DATA STRUCTURES (COMMON TO CSE/CSD/AIML)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Implement abstract data types for linear data structures
CO2:	Solve real world problems using stack and queue linear data structures
CO3:	Apply various non-linear tree data structures in real time applications
CO4:	Design algorithms to solve common graph problems
CO5:	Analyze various searching, sorting and hashing techniques

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO 1	PSO2	PS 03
CO1	3	3	3	1	1	1	1	1	1	1	2	1	2	3	3
CO2	2	2	2	2	3	2	2	1	2	1	1	2	2	3	2
CO3	3	2	3	1	3	1	1	1	2	1	1	1	2	3	3
CO4	2	3	3	2	3	1	2	2	1	1	1	1	1	2	3
CO5	2	2	2	2	2	1	2	2	1	1	1	2	2	2	2

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: LINEAR DATA STRUCTURES – LIST — **9 Hours**

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 Manipulation

Unit 02: LINEAR DATA STRUCTURES – STACKS, QUEUES — **9 Hours**

Stack ADT – Operations – Applications – Evaluating arithmetic expressions - Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – Double ended queue – Applications of queues

Unit 03: NON LINEAR DATA STRUCTURES – TREES — **9 Hours**

Trees – Traversals – Binary Trees – Expression trees – Applications of trees – Binary search trees - AVL Trees – B-Tree – Heap – Applications of heap –Tries

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Unit 04: NON LINEAR DATA STRUCTURES – GRAPHS	9 Hours
Graphs - Representation of graph – Graph traversals – Breadth-first traversal – Depth-first traversal – Minimum Spanning Trees: Prim's algorithm, Kruskal's algorithm – Shortest path algorithms: Dijkstra's algorithm, Floyd Warshall algorithm - Applications of Graphs: Topological Sort	
Unit 05: SEARCHING, SORTING AND HASHING TECHNIQUES	**9 Hours**
Searching - Linear Search – Binary Search, Sorting – Bubble sort – Selection sort – Insertion sort – Merge sort, Hashing - Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing	

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs

TEXT BOOKS

1.	Mark Allen Weiss, "Data structures and Algorithm Analysis in C", Pearson Education, New Delhi, Second Edition, 2020.

REFERENCES

1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest , Clifford Stein, "Introduction to Algorithms" ,4th Edition, MIT Press, 2022.
2.	Jean Paul Tremblay and Sorenson, "An Introduction to Data Structures with Applications", McGraw Hill Publishing Company, New Delhi, Second Edition, 2017.
3.	Yedidyah Langsam, Moshe J Augenstein and Aaron M Tanenbaum, "Data Structures using C and C++", Prentice Hall of India/ Pearson Education, New Delhi, 2006.
4.	Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Silicon Press, New Jersey, Second Edition, 2008

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U23CS302	COMPUTER ARCHITECTURE (COMMON TO CSE/CSD/AIML)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Comprehend the operational concepts of computers, instruction set architectures, addressing modes and performance metrics
CO2:	Identify the processor component and its functionalities, and mechanism of control signals generation in hardwired control and micro programmed control unit
CO3:	Apply the various arithmetic operations and discuss the design of ALU
CO4:	Implement the concept of pipelining and assess the performance of processors
CO5:	Analyze various performance measures of computers with the choice of different memory and I/O interfaces

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	1	1	2	2	2	2	3	3	3	2	2
CO2	2	3	3	3	1	1	3	2	3	3	2	1	3	2	2
CO3	2	3	3	3	1	2	2	1	3	1	2	2	2	2	2
CO4	2	3	3	3	3	1	1	2	3	1	2	3	3	2	2
CO5	2	2	3	2	2	1	1	1	2	2	2	2	2	2	2

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: BASIC STRUCTURE OF COMPUTERS	**9 Hours**

Functional units – Basic operational concepts – Bus structures – Instructions and instruction sequencing – Hardware – Software Interface – Translation from a high level language to the Hardware language- Instruction set architecture – Styles and features-Addressing modes – RISC – CISC- Amdhal's law- Performance and metrics

Unit 02 BASIC PROCESSING UNIT	**9 Hours**

Components of the processor-Data path and control- Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control.

Unit 03: ARITHMETIC FOR COMPUTERS	**9 Hours**

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Signed and Unsigned number representations - Arithmetic operations: Addition and Subtraction – Fast Adders – Binary Multiplication – Booth algorithm-Binary Division – Floating Point Numbers – Representation and operations				
Unit 04: PIPELINING				**9 Hours**
Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling				
Unit 05: MEMORY AND I/O				**9 Hours**
Need for a hierarchical memory system – Types and characteristics of memories – Cache memories – Improving cache performance – Virtual memory – Memory management techniques - Accessing I/O devices – Programmed Input/Output – Interrupts – Direct Memory Access – Need for Standard I/O Interfaces like PCI, SCSI, USB- Case study-Multicore processors				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

TEXT BOOKS	
1.	Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2021
REFERENCES	
1.	John L. Hennessey and David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier Publishers, Sixth Edition, 2017.
2.	William Stallings, "Computer Organization and Architecture – Designing for Performance", Ninth Edition, Pearson Education, 2013.
3.	John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill,2017
4.	V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education,2008

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U23CS303	OBJECT ORIENTED PROGRAMMING USING JAVA (COMMON TO CSE/CSD/AIML)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Comprehend the fundamental concepts of Object-Oriented Programming.
CO2:	Implement Inheritance, interfaces, polymorphism, abstract classes.
CO3:	Write code for exception handling, packages, and multithreading.
CO4:	Write program on string handling classes and the collection framework.
CO5:	Implement the IO stream and file operations.

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	3	3	2	3	1	1	1	1	2	1	1
CO2	3	2	2	1	3	3	3	3	2	1	3	1	3	2	1
CO3	3	2	2	1	3	3	3	3	2	1	3	1	1	1	1
CO4	2	2	3	1	3	3	3	3	2	1	3	1	1	1	1
CO5	2	2	3	1	3	3	3	3	2	1	3	1	1	1	2

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: INTRODUCTION	**8 Hours**

Object Oriented Programming Concepts – Java Fundamentals – Structure of Java Programming – Data types – Arrays - Type Conversion – Class and Objects - Methods – Constructor - Memory Management – "this" keyword – Access specifier – Abstraction - Encapsulation – Static members.

Unit 02: INHERITANCE, INTERFACE AND POLYMORPHISHM	**12 Hours**

Aggregation – Association – Inheritance - Types of Inheritance – Single – Multilevel – Hierarchical – Interface - Polymorphism: Overloading and Overriding - Abstract Classes and Methods – Final Object and Wrapper Class

Unit 03: EXCEPTION HANDLING AND THREAD	**9 Hours**

Exception handling – Built in Exception and Custom Exception - Packages – Thread - Thread class – Runnable

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Interface – Multithread Programming					
Unit 04: STRING HANDLING AND COLLECTION FRAMEWORK					**8 Hours**
String – String builder – String buffer – Regular Expression - Generic class and Methods – collection framework – Vector - Arraylist – Hashmap					
Unit 05: JAVA I/O					**8 Hours**
Java I/O – Byte Stream -File Input Stream – File Output Stream - Data Input Stream – Data Output Stream - Character Stream -File Reader and File Writer - Serialization.					
Theory: 45 Hrs	**Tutorial: 0**	**Practical: 0**	**Project:0**		**Total Hours: 45 Hrs**

	TEXT BOOKS
1.	Herbert Schildt, "Java the Complete Reference", 13th edition Tata Mc Graw Hills, 2023
2.	Cay S. Horstmann, Gary cornell, —Core Java Volume –I Fundamentals, 11th Edition, Prentice Hall, 2020.
	REFERENCES
1.	Paul Deitel and Harvey Deitel, —" Java How to Program (Early Objects)", Tenth Edition, Pearson Prentice Hall 2014.
2.	Timothy Budd, —" An Introduction to Object-Oriented Programming", Third Edition, Pearson Education, 2008.
3.	E.Balaguruswamy,"Programming with Java", Second Edition, TMH, 2009

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U23CS304	OPERATING SYSTEMS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Compare the different operating system structures
CO2:	Evaluate the various process scheduling algorithms
CO3:	Design algorithms for achieving process synchronization
CO4:	Evaluate the various memory management techniques
CO5:	Analyze the effectiveness of a file system

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	2	1	-	1	2	2	1	3	1	2	3
CO2	3	3	3	2	2	1	-	2	2	2	1	3	2	2	2
CO3	3	3	3	2	2	1	1	2	3	2	1	3	3	2	2
CO4	3	3	3	2	2	1	1	2	3	2	1	3	3	2	2
CO5	3	3	3	2	2	2	1	2	3	2	1	3	3	2	2

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: INTRODUCTION AND OPERATING SYSTEM STRUCTURES	**9 Hours**

Introduction - Mainframe Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs – System Structure – Virtual Machines – System Design and Implementation

Unit 02: PROCESS MANAGEMENT	**9 Hours**

Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication- Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - Case study – Linux Scheduling

Unit 03: PROCESS SYNCHRONIZATION AND DEADLOCKS	**9 Hours**

Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization –

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Critical regions – Monitors. System Model – Deadlock Characterization – Methods for handling Deadlocks - Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks					
Unit 04: STORAGE MANAGEMENT AND FILE SYSTEM INTERFACE					**9 Hours**
Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging - Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File System Mounting – Protection. Case study – Linux memory management					
Unit 05: FILE SYSTEM IMPLEMENTATION AND MASS STORAGE STRUCTURE					**9 Hours**
File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management - Case study – Linux file system					
Theory: 45 Hrs	**Tutorial: 0**	**Practical: 0**	**Project:0**		**Total Hours: 45 Hrs**

	TEXT BOOKS
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley & Sons (ASIA) Pvt. Ltd, 2018.
	REFERENCES
1.	Harvey M. Deitel, P.J.Deitel and D.R.Choffnes, "Operating Systems", 3rd Edition, Pearson Education Pvt. Ltd, 2007.
2.	Andrew S. Tanenbaum and Herbert Bos, "Modern Operating Systems", Pearson Education Pvt. Ltd, 5th Edition, 2024.
3.	William Stallings, "Operating System Internals and Design Principles", Pearson Education Pvt. Ltd, 9th Edition, 2019.

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U23CS305	COMPUTER AND INFORMATION ETHICS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Identify the core values that mold the ethical behavior of an IT engineer
CO2:	Describe the ethical principles that should be followed by all the stake holders of IT
CO3:	Analyze the ethical issues related to freedom of expression
CO4:	Describe the intellectual property rights and biometric technologies
CO5:	Exercise the ethical principles that should be followed while handling advance computer technologies

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	1	3	1	3	2	2	3	3	2	2	2
CO2	2	3	3	3	1	2	3	3	3	3	3	3	3	3	2
CO3	2	3	3	2	3	2	3	3	3	3	3	3	3	1	2
CO4	2	3	3	1	2	2	3	3	3	3	1	3	3	1	2
CO5	2	3	3	2	1	3	3	3	3	2	3	3	3	1	2

Course Assessment methods

Direct		Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: INTRODUCTION	**9 Hours**

Introduction - Ethics in the Business World - Including Ethical Considerations in Decision Making - Ethics in Information Technology - IT Security Incidents - Implementing Trustworthy Computing

Unit 02: ETHICS IN INFORMATION TECHNOLOGY	**9 Hours**

Ethics for IT Professionals – Ethics for IT Users - Ethics for IT Organizations - The Impact of IT on the Standard of Living and Worker Productivity - The Impact of IT on HealthCare Costs

Unit 03: FREEDOM OF EXPRESSION	**9 Hours**

Introduction – Anonymity – Security – Privacy - Ethical and Legal Framework for Information - Social Context of Computing

Unit 04: INTELLECTUAL PROPERTY RIGHTS	**9 Hours**

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Introduction – Copyrights – Patents - Trade Secrets - Key Intellectual Property Issues - Biometric Technologies Ethics: Introduction and Definitions - The Biometric Authentication Process - Biometric System Components - Types of Biometric Technologies - Ethical Implications of Biometric Technologies - The Future of Biometrics

Unit 05: COMPUTER CRIMES AND NEW FRONTIERS FOR COMPUTER ETHICS	**9 Hours**
Computer Crimes: Introduction - History of Computer Crimes - Types of Computer System Attacks - Motives of Computer Crimes - Costs and Social Consequences - Computer Crime Prevention Strategies - New Frontiers for Computer Ethics: Artificial Intelligence – Cyberspace - Social Network Ecosystems - Mobile Systems	

Theory: 45 Hrs	**Tutorial: 0**	**Practical: 0**	**Project:0**		**Total Hours: 45 Hrs**

	TEXT BOOKS
1.	George W. Reynolds, "Ethics in Information Technology", Sixth Edition, Cengage Learning, 2019.
2.	Joseph Migga Kizza, "Ethical and Social Issues in the Information Age", Seventh Edition, Springer, 2023.
	REFERENCES
1.	Gerard Ian Prudhomme, "The Handbook of Information and Computer Ethics", First edition, Arcler Education Inc, 2016.
2.	Luciano Floridi, "The Cambridge Handbook of Information and Computer Ethics" , First edition, Cambridge University Press, 2010.
3.	Kenneth E. Himma and Herman T. Tavani, "The Handbook of Information and Computer Ethics", First Edition, Wiley-Blackwell, 2008.
4.	Robert N. Barger, "Computer Ethics: A Case-based Approach", First edition, Cambridge University Press, 2008.
5.	Deborah G. Johnson, "Computer Ethics (Occupational Ethics)", Second Edition, PHI,1993

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U23GE302	ENVIRONMENT AND CLIMATE SCIENCE	L	T	P	J	C
		2	0	0	0	0

Course Outcomes

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

CO1:	Describe the importance of the acute need for environmental awareness and discuss significant aspects of natural resources like forests, water and food resources.
CO2:	Illustrate the concepts of an ecosystem and provide an overview of biodiversity and its conservation.
CO3:	Analyze the causes, effects of various environmental pollution and their remedial measures.
CO4:	Provide solutions to combat environmental issues like global warming, acid rain, ozone Layer depletion.
CO5:	Analyze the effect of climate change in various sectors and their remedial measures.

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				2	2							-
CO2	2	-					1						-	-
CO3	3	2				2	3							2
CO4	3	2				2	3							2
CO5	3	2				2	2							2

Course Assessment methods

Direct		Indirect
CIE test I (30) - Theory CIE test II (30) - Theory CIE test III (40)- Theory	Total CIE: **100 marks** Semester End Examination – **NIL**	Course end survey

Unit 01: INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES	**6 Hours**

Definition, Scope and Importance Forest Resources: - Use and over - exploitation, deforestation, Case Studies, Water Resources: - Use and Over-Utilization of Surface and ground water, Floods, Drought, Food Resources-Effects of Modern Agriculture, Fertilizer- Pesticide Problems-Role of an Individual in Conservat of Natural Resources.

Unit 02: ECOSYSTEMS AND BIODIVERSITY	**6 Hours**

Structure and Function of an Ecosystem-Energy Flow in the Ecosystem -Food Chains, Food Webs and Ecological Pyramids.

Introduction to Biodiversity-Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values-India as a Mega-Diversity Nation-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 conservation of Biodiversity.				
Unit 03: ENVIRONMENTAL POLLUTION				**6 Hours**
Definition – Causes, Effects and Control Measures of: - (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution, Solid Waste Management- Effects and Control Measures of Acid Rain – Role of an Individual in Prevention of Pollution.				
Unit 04: FUNDAMENTALS OF CLIMATE CHANGE				**6 Hours**
Sustainable Development-Climate Change- Causes and effects of Global Warming-Effect of global warming in food supply, plants, sea, coral reef, forest, agriculture, economy-Kyoto Protocol in reduction of greenhouse gases-Ozone Layer Depletion-mechanism, effects and control measures- Montreal Protocol to prot ozone layer depletion-Rainwater Harvesting-Effect of climate change due to air pollution Case study - CNG vehicles in Delhi.				
Unit 05: EFFECT OF CLIMATE CHANGE				**6 Hours**
Fungal diseases in forests and agricultural crops due to climatic fluctuations - Growing energy needs - effect of climate change due to non-renewable energy resources. Renewable energy resources in the prevention of climatic changes- Effect of climatic changes in ground water table, garments, monuments, buildings, consumption of energy, agriculture and in electric power sector - Carbon credit - carbon footprint - disaster management -Role of an individual to reduce climate change.				
Theory: 30	**Tutorial: –**	**Practical: –**	**Project:–**	**Total Hours: 30 Hrs**

TEXT BOOKS

1.	Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co. 2018.
2.	Anubha Kaushik and Kaushik, "Environmental Science and Engineering" New Age International Publication, 4th Multicolour Edition, New Delhi, 2014.

REFERENCES

1.	S. Radjarejesri et al., "Environmental Science" Sonaversity, Sona College of Technology, Salem, 2018.
2.	Masters, G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., 2nd Edition, 2004.
3.	Erach, B., "The Biodiversity of India", Mapin Publishing P.Ltd.,Ahmedabad, India.
4.	Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

14/6/25

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14.6.2025

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U23CS306	DATA STRUCTURES LABORATORY (COMMON TO CSE/CSD/AIML)	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1	Design and develop simple programs using data structures
CO2:	Apply non-linear data structures for various real time applications
CO3:	Design shortest path algorithm for various real life applications

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	1	2	1	1	2	1	1	2	3	3
CO2	2	3	1	2	3	2	1	3	2	2	1	2	3	2	2
CO3	3	2	3	1	3	1	2	2	2	1	2	1	3	2	3

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz 1- (5) CIE test II (15) Quiz I1- (5)	RTPS (10) Record (10) Total CIE: 60 marks Semester End Examination (40 marks)	Course end survey

List of Experiments:

1. Implementation of Lists ,Stacks and Queues
2. Implementation of Binary Tree and Traversal Techniques
3. Implementation of Binary Search Trees
4. Implementation of AVL Trees
5. Implementation of B-trees
6. Implementation of graphs using BFS and DFS.
7. Implementation of Prim's algorithm.
8. Implementation of Kruskal's algorithm
9. Implementation of Dijkstra's algorithm
10. Implementation of Floyd's algorithm
11. Implementation of Hashing and Collision Resolution Technique.
12. Implementation of Heap
13. Implement the operations on Trie structure

Theory: 0	Tutorial: 0	Practical: 30Hrs	Project:0	Total Hours: 30 Hrs

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U23CS307	OBJECT ORIENTED PROGRAMMING USING JAVA LABORATORY (COMMON TO CSE/CSD/AIML)	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1	Design and develop simple programs using OOPS concepts
CO2:	Apply thread and collection class for various real time applications
CO3:	Develop java program using IO streams and File class

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	2	2	1	3	3	2	2	3
CO2	3	3	3	3	3	3	2	3	2	1	3	3	3	3	3
CO3	3	3	3	3	3	3	2	3	2	1	3	3	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz 1- (5) CIE test II (15) Quiz II- (5)	RTPS (10) Record (10) Total CIE: 60 marks Semester End Examination (40 marks)	Course end survey

List of Experiments:

1. Develop simple Java programs using Data types, Operators, Selection and Iteration control structures
2. Develop simple Java programs using Classes and objects
3. Implement Java programs using Constructors and this keyword
4. Implement the following OOP concepts in Java:
   a. Encapsulation
   b. Aggregation
   c. Association
   d. Inheritance
   e. Polymorphism
   f. Abstraction
   g. Interfaces
5. Handle exceptions in Java programs.
6. Implement multithreading in Java programs.
7. Use generic classes and methods in Java.
8. Implement collections like Arraylist, Hashmap
9. Work with Java I/O operations
   a. Implement Input streams and Output streams in Java
   b. Develop java programs to access and perform various operations in file content
10. Implement the given use case/project using various Object-oriented concepts in Java

Theory: 0	Tutorial: 0	Practical: 30Hrs	Project:0	Total Hours: 30 Hrs

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U23GE301	SOFT SKILLS AND APTITUDE - I	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1:	Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
CO2:	Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning
CO3:	Demonstrate higher than BA-I and II levels of verbal aptitude skills in English regarding specific topics.

Pre-requisite: Basic Aptitude I & II

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	2	2	3	3	3	1	3	1	1
CO2	3	3	3	2	2	2	1	3	3	2	1	3	2	2
CO3	1	1	1	1	1	1	1	3	3	3	1	3	1	1

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz - 1 (5) CIE test II (15) Quiz – II (5)	RTPS (10) Record (10) Total CIE marks : **60 marks** Semester End Examination : **40 marks**	Course end survey

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. Attitude building b. Self-awareness and self -acceptance c. Dealing with criticism d. Innovation and creativity e. Problem solving and decision making f. Public speaking g. Group discussions.

2. Quantitative Aptitude and Logical Reasoning		**Solving problems with reference to the following topics:** a. Vedic Mathematics b. Simplification c. Number Properties d. Averages e. Percentage f. Profit Loss and Discount g. Ratio & Mixtures h. Equation i. Problem on Ages j. Data interpretation		
3. Verbal Aptitude		**Demonstrating English language skills with reference to the following topics:** a. Verbal analogy b. Tenses c. Prepositions d Reading comprehension e. Choosing correct / incorrect sentences f. Describing pictures		
Theory : —	**Tutorial : —**	**Practical : 30hrs**	**Project : —**	**Total hours : 30hrs**

6/06/2025

Dr.S.Anita
Professor & Head
Department of Training

Dr. S. ANITA
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ABOUT THE COURSE

Design thinking is a systematic method of solving problems. This method is unique that it starts and ends with humans. The design thinkers start by observing, interviewing or just plain experiencing a situation. Then, they proceed to improve the situation of the humans by solving problems for them.

COURSE LAYOUT

Week 1 : Introduction to Design Thinking
Week 2 : Empathize Phase: Customer Journey Mapping
Week 3 : Analyze Phase: 5-Whys and How might we...
Week 4 : Solve Phase: Ideation: Free Brainstorming & Make/Test Phase: Prototype

TOTAL HOURS : 15

BOOKS AND REFERENCES

Prescribed Textbook for the course:

1.Karmic Design Thinking by Prof. Bala Ramadurai, available at Amazon (paperback), Amazon (e-book), Flipkart, Pothi, bookspace.in

REFERENCES

1.Design: Creation of Artifacts in Society by Prof. Karl Ulrich, U. Penn
2.Change by Design by Tim Brown.

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Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for B.E/B.Tech. Semester IV under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	U23MAT401B	Numerical Methods	3	1	0	0	4	BS	60	TT
2.	U23CS401	Design and Analysis of Algorithms	3	0	0	0	3	PC	45	T
3.	U23CS402	Software Engineering	3	0	0	0	3	PC	45	T
4.	U23CS403	Database Management Systems	3	0	0	0	3	PC	45	T
5.	U23EC407	Embedded System Design	3	0	0	0	3	ES	45	T
6.	U23GE402	**Audit Course:** Essence of Indian Traditional Knowledge	2	0	0	0	0	AC	30	T
Practical courses										
7.	U23CS404	Software Development Laboratory	0	0	4	0	2	PC	60	L
8.	U23CS405	Database Management Systems Laboratory	0	0	4	0	2	PC	60	L
9.	U23GE401	Soft Skills and Aptitude-II	0	0	2	0	1	EEC	30	L
Total Credits							21			

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project, P-Project

Approved By

Chairperson, Computer Science and Engineering BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.B.Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/ Computer Science and Engineering, Fourth Semester B.E. CSE Students and Staff, COE

SEMESTER – IV	NUMERICAL METHODS	L	T	P	J	C
U23MAT401B	(CSE)	3	1	0	0	4

COURSE OUTCOMES

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

CO1:	solve algebraic, transcendental and linear system of equations using appropriate numerical techniques.
CO2:	apply the Newton's forward, backward, divided difference formulae and Lagrange's formula to obtain the polynomial interpolation and their derivatives at desired point.
CO3:	apply the Trapezoidal rule, Simpson's rule, Romberg's method and Gaussian quadrature formula to evaluate definite integrals.
CO4:	solve the linear and nonlinear ordinary differential equations of first order by single and multi-step methods.
CO5:	apply the appropriate finite difference schemes to solve partial differential equations.

Pre-requisites:

- Fundamentals of elementary algebra
- Fundamentals of calculus
- Fundamentals of trigonometry
- Fundamentals of geometry

CO / PO, PSO Mapping

(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2							2		2	2
CO2	3	3	3	3	2							2		2	2
CO3	3	3	3	3	2							2		2	2
CO4	3	3	3	3	2							2		2	2
CO5	3	3	3	3	2							2		2	2

Course Assessment methods

Direct		Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Objectives Test (6)	Attendance (5) Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01	SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS	12 Hours

Solution of algebraic and transcendental equations by Regula-Falsi method, Fixed point theorem (statement only), Fixed point iteration method and Newton Raphson method – Solution of linear system of equations by Cholesky decomposition method – Eigen values of a matrix by Power method.

Unit 02	INTERPOLATION AND NUMERICAL DIFFERENTIATION	12 Hours

Newton's forward and backward difference formulae – Newton's divided difference interpolation – Lagrange's interpolation – Approximation of derivatives using interpolation polynomials.

Unit 03	NUMERICAL INTEGRATION	12 Hours

Trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rules – Romberg's method – Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal rule.

Unit 04	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	12 Hours

Numerical solution of first order ordinary differential equations by Taylor's series, Euler, Modified Euler, Fourth order Runge – Kutta method and Milne's predictor-corrector methods.

Unit 05	NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS	12 Hours

Classification of second order partial differential equations – Finite difference schemes for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit (Bender-Schmidt's) and implicit (Crank Nicholson) methods.

Theory: 45 Hours	Tutorial: 15 Hours	Practical: -	Project: -	Total Hours: 60 Hours

TEXT BOOKS:

1. R. L. Burden and J. D. Faires, "Numerical Analysis" Cengage Publishers, 9th Edition, 2016.
2. P. Kandasamy, K. Thilagavathy and K. Gunavathy, "Numerical Methods", S. Chand Publishers, 5th Edition, 2013.

REFERENCE BOOKS:

1. T. Veerarajan and T. Ramachandran, "Numerical Methods with programs in C", McGraw Hill Publishers, 2nd Edition, Reprint, 2019.
2. C. F. Gerald and P. O. Wheatly, "Applied Numerical Analysis", Pearson Publishers, 7th Edition, 2004.
3. B. S. Grewal, "Numerical Methods in Engineering & Science with Programs in C, C++ & MATLAB", Khanna Publishers, 11th Edition, 2013.
4. K. Sankar Rao, "Numerical Methods for Scientists and Engineers", Prentice Hall Publishers, 4th Edition, 2018.

B. E. / B. TECH REGULATIONS 2023	HOD/ MATHEMATICS
BoS DATE: 22.06.2024	

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IV-CSE

U23CS401	DESIGN AND ANALYSIS OF ALGORITHMS (Common to CSE, CSD, AIML)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Comprehend and compare the different algorithms that are used to solve various problems
CO2:	Design and solve divide and conquer problems using the recurrence relations.
CO3:	Design and solve the problems using greedy and dynamic programming paradigms.
CO4:	Design the algorithms for solving the backtracking and transform and conquer methodologies.
CO5:	Apply the branch and bound technique to solve problems

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3	3	3	3	-	-	-	1	1	1	1	3	3	3	3
CO2	2	3	3	3	1	-	-	1	1	1	1	3	3	3	3
CO3	3	3	3	3	1	-	1	1	1	1	1	3	3	3	3
CO4	3	3	3	3	1	-	1	1	1	1	1	3	3	3	3
CO5	3	3	3	3	1	1	1	1	1	1	1	3	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Objectives Test (6) Attendance (5)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: FUNDAMENTALS OF ALGORITHM ANALYSIS — **9 Hours**

Introduction - Problem solving techniques-Analysis framework – Time space tradeoff – Asymptotic notations – Conditional asymptotic notation – Properties of Big-Oh notation – Recurrence equations – Mathematical Analysis of Non-recursive algorithms - Mathematical analysis of recursive Algorithms – Analysis of linear search - Empirical analysis - Algorithm visualization.

Unit 02: BRUTE FORCE AND DIVIDE AND CONQUER STRATEGIES — **9 Hours**

Brute Force: Selection Sort - Bubble Sort – String matching - Exhaustive Search: Travelling Sales-man problem - Divide and Conquer: General Method – Binary Search – Closest-pair problem – Merge Sort-Quick Sort.

Unit 03: GREEDY AND DYNAMIC PROGRAMMING PARADIGMS — **9 Hours**

Greedy Algorithms: General Method – Container Loading – Huffman code – Knapsack problem - Dynamic Programming: General Method – Multistage Graphs – Optimal binary search trees

Unit 04: BACKTRACKING AND TRANSFORM AND CONQUER METHODOLOGIES — **9 Hours**

Backtracking: General Method – N-Queen's problem – Sum of subsets – Graph coloring – Hamiltonian problem. Transform and conquer: Presorting – Gaussian elimination.

Unit 05: GRAPH AND BRANCH AND BOUND STRATEGIES				9 Hours
Graph: Connected Components – Bi-connected components – Branch and Bound: General Method (FIFO and LC) – Job assignment problem - 0/1 Knapsack problem – Introduction to NP-Hard and NP-Completeness				
Theory: 45 Hrs	**Tutorial: - -**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

TEXT BOOKS	
1.	Anany Levitin "Introduction to the design and Analysis of Algorithms", Pearson Education, Third Edition, 2017.
REFERENCES	
1.	T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Fourth Edition, Prentice Hall of India Pvt. Ltd, 2022.
2.	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, Third Edition, 2005.
3.	Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Computer Algorithms/ C++", Second Edition (VTU EDITION), Universities Press, 2019.
4.	K.S. Easwarakumar, "Object Oriented Data Structures Using C++", Vikas Publication House Pvt Ltd, First Edition, 2000.

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U23CS402	SOFTWARE ENGINEERING	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Compare and analyze the various life cycle models of software process.
CO2:	Design an appropriate analysis model that suits the requirement.
CO3:	Create models using UML for various applications.
CO4:	Apply different design strategies in software application development strategies.
CO5:	Apply appropriate testing strategies to uncover errors in the software.

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3	3	3	3	-	-	-	1	1	1	1	3	3	3	3
CO2	2	3	3	3	1	-	-	1	1	1	1	3	3	3	3
CO3	3	3	3	3	1	-	1	1	1	1	1	3	3	3	3
CO4	3	3	3	3	1	-	1	1	1	1	1	3	3	3	3
CO5	3	3	3	3	1	1	1	1	1	1	1	3	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Objectives Test (6) Attendance (5)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: SOFTWAREP ROCESS	**9 Hours**

Software process structure – Process models: Waterfall model, Incremental process models, Evolutionary process models, Specialized process models – Unified Process-Agile development: Agile process – Extreme programming – Scrum.

Unit 02 SOFTWARE REQUIREMENTS	**9 Hours**

Requirements engineering – Eliciting requirements - Developing use cases – Building the analysis model – Negotiating requirements – Requirements monitoring – Validating requirements – Requirements analysis

Unit 03: UML MODELING	**9 Hours**

Introduction – Unified Modeling Language – Static model – Dynamic model – Unified Modeling Language - UML diagrams – UML class diagram – Use case diagram – UML dynamic modeling: UML interaction diagrams – UML state chart diagram – UML activity diagram – Implementation Diagrams – Component diagram – Deployment diagram

Unit 04: SOFTWARE DESIGN	**9 Hours**

Design concepts and model – Architectural design: Software architecture, Architectural styles – Architectural design –

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Component level design: Designing class-based components, Conducting component level design – User interface design: User interface analysis and design – Interface analysis – Interface design steps - Design patterns.				
Unit 05: SOFTWARE TESTING FUNDAMENTALS				**9 Hours**
Software testing strategies: Strategic approach – Issues – Test strategies for conventional and Object Oriented software – Validation and System testing – Debugging – Testing conventional applications: White box testing – Basis path testing – Control structure testing – Black box testing – Software configuration management – SCM repository – SCM process.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

TEXT BOOKS	
1.	Roger S Pressman, "Software engineering-A practitioner's Approach, McGraw-Hill, International Edition, 9th edition, 2023.
REFERENCES	
1.	Ali Bahrami, "Object Oriented Systems Development", 2nd Edition, Tata McGraw-Hill, New Delhi, 2017.
2.	Ian Sommerville, "Software engineering", Pearson education Asia, 9th edition, 2017.
3.	Pankaj Jalote, "An Integrated Approach to Software Engineering", Masood Books UP, Third Edition, 2018.
4.	James F Peters and Witold Pedryez,"Software Engineering– An Engineering Approach", Wiley India, 2007.

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U23CS403	DATABASE MANAGEMENT SYSTEMS (Common to CSE, CSD, AIML)	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Comprehend the need, background, architecture and evolution of database management system and the concepts of ER model.
CO2:	Design and develop relational models with an emphasis on how to organize, maintain, retrieve and secure information efficiently and effectively from a RDBMS.
CO3:	Design and evaluate the normality of a complex logical data model, by identifying and rectifying anomalies through normalization processes and analyze the requirements for optimal data storage and indexing techniques.
CO4:	Implement advanced query processing methodologies, utilizing a range of operators and optimization techniques.
CO5:	Design and implement advanced concurrency control and transaction recovery methods to ensure consistency, isolation, and efficiency, optimizing system performance and reliability in the face of failures in complex database environments

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	-	1	1	1	1	3	3	3	3
CO2	2	3	3	3	1	-	-	1	1	1	1	3	3	3	3
CO3	3	3	3	3	1	-	1	1	1	1	1	3	3	3	3
CO4	3	3	3	3	1	-	1	1	1	1	1	3	3	3	3
CO5	3	3	3	3	1	1	1	1	1	1	1	3	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Objectives Test (6) Attendance (5)	Assignment/seminar/Quiz (5) Total CIE: **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: INTRODUCTION — **8 Hours**

Database and Database Users: Characteristics of database approach- Advantages of using the DBMS Approach-Database Applications.

Database system concepts and architecture: Data Models-Schemas- Instance-Three schema architecture and data independence- DBMS languages and interfaces- database system Environment- ER model.

Unit 02: RELATIONAL MODEL — **12 Hours**

Relational data model-relational constraints: Relational model concepts- Relational constraints and Relational data base schema- update operations- basic Relational algebra operations- additional relational operations.
SQL: Data definition and Data type- specifying SQL constraints- Basic queries-insert-delete- update-complex queries- views-assertions and triggers- dynamic SQL.

Database security and Authorization: Security issues- grant/revoke privileges- SQL injections.

Unit 03: RELATIONAL DATABASE DESIGN	**9 Hours**

Functional dependencies and normalization: Functional Dependencies-Normal forms: 1NF- 2NF- 3NF-Boyce Codd NF-decomposition-Multivalued dependencies and 4NF- join dependencies and 5NF.

Unit 04: DATA STORAGE AND QUERY PROCESSING	**8 Hours**

Disk Storage, Basic File Structures, and Hashing: Secondary Storage Device-RAID-Operations on Files-Heap Files-Sorted Files-Hashing Techniques.
Indexing Structures for Files: Types of Single-Level Ordered Indexes- Multilevel Indexes-- Dynamic Multilevel Indexes Using B-Trees and B+-Trees.

Query Processing: Translating SQL Queries into Relational Algebra- Algorithms for External Sorting-Algorithms for SELECT and JOIN Operations- Algorithms for PROJECT and Set Operations

Unit 05: TRANSACTION MANAGEMENT	**8 Hours**

Transaction Processing: Introduction-Transaction and System Concepts- desirable Properties of Transactions-Schedules based on Recoverability- Schedules based on Serializability.
Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control- Timestamp Ordering.

Database Recovery Techniques: Recovery Concepts, Deferred Update, Immediate Update-Shadow Paging-ARIES recovery algorithm.

Theory: 45 Hrs	**Tutorial: 0**	**Practical: 0**	**Project:0**		**Total Hours: 45 Hrs**

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth and Sudarshan. S, "Database System Concepts", Seventh Edition, McGrawHill, 2021

REFERENCES

1. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems", 7th Edition, Addison-Wesley, 2017.
2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 3rd Edition, 2018.
3. Date. C. J, Kannan. A, Swamynathan. S, "An Introduction to Database Systems", Pearson India, 8th Edition, 2006.
4. Rajesh Narang, "Database Management systems", PHI, 2nd Edition, 2011.

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U23EC407	EMBEDDED SYSTEM DESIGN	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Discuss the hardware and software architectures of embedded system
CO2:	Develop embedded design using suitable RTOS objects.
CO3:	Discuss the architecture, memory and peripherals of 8051 microcontroller
CO4:	Develop the application based on 8051 using embedded C programs.
CO5:	Investigate the architecture of ARM processor and peripherals

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	3	2	2	2	2	1	2	2	3	2	2
CO2	3	3	3	3	2	3	3	2	3	2	3	2	3	3
CO3	3	2	3	3	2	2	2	2	1	3	2	3	3	3
CO4	2	3	3	3	3	3	3	3	3	2	3	2	3	3
CO5	2	2	2	2	2	1	2	2	1	1	1	3	2	2

Course Assessment methods

Direct		Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Objectives Test (6) Attendance (5)	Assignment/seminar/Quiz (5) Total CIE : **40 marks** Semester End Examination: **60 marks**	Course end survey

Unit 01: Architecture of Embedded Systems — **9 Hours**

Introduction – Application Areas – Categories of Embedded System - Specialties of Embedded System – Recent Trends in Embedded System – Overview of Embedded System Architecture – Hardware Architecture – Software Architecture – Communication Software – Process of Generation of Executable Image –

Development – Testing Tools.				
Unit 02: Design of Embedded Systems				**9 Hours**
Hardware design – Selection of processor – Software design – Implementation – Integration and testing – Types of testing – Types of Hardware Platforms – Hardware Description of AVR microcontroller development and its features – Introduction to RTOS – Architecture of the kernel – Static and Dynamic Scheduling Algorithms				
Unit 03: 8051 Microcontroller				**9 Hours**
Introduction to Microprocessor – Microcontroller – Architecture of 8051 Microcontroller – Signals – I/O ports – memory – Counters and timers – Serial data I/O – Interrupts.				
Unit 04: Embedded 'C' programming in 8051				**9 Hours**
Data types and time delay – I/O Programming – Logic Operations – Data Conversion – Dta Serialization – Timer - Counter				
Unit 05: ARM Processor and Peripherals				**9 Hours**
ARM Architecture Versions – ARM Architecture – Instruction Set – Stacks and Subroutines – Features of the LPC 214 X Family – Peripherals – The Timer Unit – Pulse Width Modulation units – UART – Block Diagram of ARM9 and ARM Cortex M3 MCU.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Project:--**	**Total Hours: 45 Hrs**

TEXT BOOKS

1. Marilyn Wolf, "Computers as Components – Principles of Embedded Computing System Design", 4th Edition – Morgan Kaufmann Publisher (An imprint from Elsevier), 2016
2. Mazidi, Mazidi & McKinlay, "8051 Microcontroller and Embedded System", Person New International Edition, 2nd Edition ,2014.
3. Steve Furber, "ARM System on Chip Architecture", Pearson Publications, 2nd Edition, 2015

REFERENCES

1. K.V.K.K.Prasad, 'Embedded Real-Time Systems: Concepts, Design & Programming", Dreamtech Press,2016
2. Raj Kamal "Embedded Systems Architecture Programming and Design" 2nd Edition TMH, 2010
3. Shibu K V, "Introdution to Embedded Systems", McGraw Hill, 2009

08/01/26

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U23CS404	SOFTWARE DEVELOPMENT LABORATORY	L	T	P	J	C
		0	0	4	0	2

Course Outcomes

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

CO1:	Design and implement projects using OO concepts.
CO2:	Use UML analysis and design diagrams in various applications.
CO3:	Apply appropriate design patterns for the given scenarios.

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	-	-	1	1	1	1	3	3	3	3
CO2	2	3	3	1	3	-	-	1	1	1	1	3	3	3	2
CO3	3	2	1	3	3	1	1	1	1	1	-	3	3	3	2

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz 1- (5) CIE test II (15) Quiz 2- (5)	RTPS (10) Record (10) Total CIE: **60 marks** Semester End Examination: **40 marks**	Course end survey

List of Experiments:

1. Define the problem statement.
2. Identify use cases and develop business use case model (System use case diagram).
3. Identify the conceptual classes (boundary, controller, and entity classes) and develop a domain model with UML Class diagram.
4. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
5. Draw the State Chart diagram and UML Activity diagram.
6. Develop Interface pattern.
7. Identify the User Interface and domain objects. Draw the UML package diagram.
8. Implement the User Interface (presentation) layer.
9. Implement the Business layer (domain object).
10. Implement the Data layer.

REFERENCES/MANUAL/SOFTWARE:

1. IBM RAD
1. Java / Eclipse IDE/.Net Framework/Visual Studio Package

Theory: 0	Tutorial: 0	Practical: 60Hrs	Project:0	Total Hours: 60 Hrs

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U23CS405	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	J	C
		0	0	4	0	2

Course Outcomes

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

CO1	Design schema for the given database by creating appropriate tables and write SQL queries using DDL and DML statements to retrieve information.
CO2:	Create views and triggers that automatically indicate the updating of data in the tables.
CO3:	Apply the concept of databases to the real time application development

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	3	-	-	1	1	1	1	3	3	3	3
CO2	2	3	3	1	3	-	-	1	1	1	1	3	3	3	2
CO3	3	2	1	3	3	1	1	1	1	1	-	3	3	3	2

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz 1- (5) CIE test II (15) Quiz 2- (5)	RTPS (10) Record (10) Total CIE: **60 marks** Semester End Examination: **40 marks**	Course end survey

List of Experiments:

1. Create a relational database system using DDL commands with constraints.
2. Update the database system using DML commands.
3. Query the database using simple and complex queries.
4. Create and update views.
5. High level programming language extensions (Control structures, Procedures and Functions)
6. Working with triggers.
7. Use of front-end tools to manipulate the database.
8. Menu Design.
9. Generate reports using a reporting tool.
10. Design and implementation of real time application system. (Mini Project is suggested)

Theory: 0	Tutorial: 0	Practical: 60Hrs	Project:0	Total Hours: 60 Hrs

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U23GE402	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	L	T	P	J	C
		2	0	0	0	0

	Course Outcomes
	At the end of the course, the student will be able to
CO1:	Analyze the basics of Indian Traditional knowledge in modern scientific perspectives.
CO2:	Explain the basics of Vedic science and its applications in modern days.
CO3:	Discuss the introduction and objectives of modern science.
CO4:	Describe the contribution of Noble laureates for India's achievements in Science and Technology.
CO5:	Analyze the various traditional practices for holistic health care of human beings.
	Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2			2	-							2	2
CO2	2	2	2			2	-							2	2
CO3	2	2	2			2	-							2	2
CO4	2	2	2			2	-							2	2
CO5	2	2	2			2	-							2	2

Course Assessment methods

Direct		Indirect
CIE test I (30) - Theory CIE test II (30) - Theory CIE test III (40)- Theory	Total CIE: **100 marks** Semester End Examination – **NIL**	Course end survey

Unit 01: BASIC STRUCTURE OF INDIAN KNOWLEDGE SYSTEM	6 Hours
Indian Traditional Scriptures, Exposure to 4 – Vedas (the Rigveda, the Yajurveda, the Samaveda and the Atharvanaveda), 4 – Upavedas (Ayurveda, Dhanurveda, Gandharvaveda, Sthapatya, etc.), 6 – Vedangas (Shiksha, Kalp, Nirukta, Vyakaran, Jyotish).	

Unit 02: INDIAN KNOWLEDGE SYSTEM AND MODERN SCIENCE	6 Hours
Relevance of Science and Spirituality, Science and Technology in ancient India, Superior intelligence of Indian sages and scientists.	

Unit 03: INDIAN TRADITION AND CULTURE		**6 Hours**
The Indian way of life, Introduction to Indian tradition, The Scientific Outlook and Human Values – Basics of Applied Vedic Science – modern day application of Vedas and procedure – Ancient Indian Scientific thoughts.		
Unit 04: INDIAN ARTISTIC TRADITION		**6 Hours**
Introduction and overview of significant art forms in ancient India such as painting, sculpture, Civil Engineering, Architecture, Music, Dance, Literature, etc.		
Unit 05: YOGA AND HOLISTIC HEALTH CARE		**6 Hours**
Fundamentals of yoga and holistic health – Human biology – Importance and Practice of Yoga, Pranayama and other prevailing health care techniques – Diet and nutrition – Life management – Contemporary yogic models – case study.		

Theory: 30	Tutorial: --	Practical: --	Project:--	Total Hours: 30 Hrs

REFERENCES

1. Sivaramakrishnan, V., Cultural Heritage of India- Course Material, Bharatiya Vidya Bhavan, Mumbai, 5 th Edition, 2014.
2. Capra F., Tao of Physics, Shambhala, 2010
3. Chatterjee S.C. and Datta D.M., An Introduction to Indian Philosophy, University of Calcutta, 1984.
4. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016.
5. Raja Ram Mohan Roy, Vedic Physics, Mount Meru Publication ISBN: 9781988207049.
6. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan.

20-12-2024

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U23GE401	SOFT SKILLS AND APTITUDE – II	L	T	P	J	C
		0	0	2	0	1

Course Outcomes

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

CO1:	Demonstrate capabilities in additional soft-skill areas using hands-on and/or case-study approaches
CO2:	Solve problems of increasing difficulty than those in SSA-I in given areas of quantitative aptitude and logical reasoning and score 65-70% marks in company-specific internal tests
CO3:	Demonstrate greater than SSA-I level of verbal aptitude skills in English regarding the given topics and score 65-70% marks in company-specific internal tests

Pre-requisite:

CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO-PO Mapping	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12
CO1	1	1	1	1	1	2	2	3	3	3	1	3
CO2	3	3	3	2	2	2	1	3	3	2	1	3
CO3	1	1	1	1	1	1	1	3	3	3	1	3

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz I (5) CIE test II (15) Quiz II (5)	RTPS (10) Record (10) Total CIE marks : 60 marks Semester End Examination : 40 marks	Course end survey

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. SWOT b. Goal setting c. Time management d. Stress management e. Mindfulness f. Interpersonal and Intrapersonal skills g. Presentation skills h. Group discussions

2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** a. Logarithm b. Progression c. Time & Work d. Simple Interest e. Compound Interest f. Time Speed & Distance g. Plane Geometry h. Mensuration for 2D i. Mensuration for 3D j. Syllogism
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Critical reasoning b. Theme detection c. Verbal analogy d. Prepositions e. Articles f. Cloze test g. Company specific aptitude questions

Theory: 0	**Tutorial: 0**	**Practical: 30hrs**	**Project: 0**	**Total Hours: 30hrs**

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