SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

B.E- Electrical and Computer 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: Electrical and Computer 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.	U23CHE104C	Chemistry For Electrical Engineering	3	0	0	0	3	BS	45	T
4.	U23PPR105	Problem Solving using Python Programming	3	0	0	0	3	ES	45	T
5.	U23EGR107	Engineering Graphics	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.	U23CHL111B	Chemistry Laboratory	0	0	2	0	1	BS	30	L
9.	U23PPL112	Python Programming Laboratory	0	0	2	0	1	ES	30	L
		Total Credits					19			
	Optional Language Courses**									
10.	U23OL1101	French	1	0	0	0	1	OL	15	T
11.	U23OL1102	German							15	T
12.	U23OL1103	Japanese							15	T
13.	U23OL1104	Korean							15	T
14.	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, EEE BoS**	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr. M. Renuga	**Dr.S.Padma**	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/ Electrical and Computer Engineering, First Semester B.E. EECE 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: Electrical and Computer 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.	U23MAT202B	Transforms and Differential Equations	3	1	0	0	4	BS	60	TT
3.	U23PHY203D	Engineering Physics	3	0	0	0	3	BS	45	T
4.	U23EE201	Electrical Circuit Analysis	3	1	0	0	4	PC	60	TT
5.	U23CPR205	Programming in C	3	0	0	0	3	ES	45	T
6.	U23TAM201	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	0	1	HS	15	T
7.	U23GE201	Basic Aptitude -II	2	0	0	0	0	AC	30	T
	Practical courses									
8.	U23PHL210B	Engineering Physics Laboratory	0	0	2	0	1	BS	30	L
9.	U23EE202	Electrical Circuits Laboratory	0	0	3	0	1.5	PC	45	L
10.	U23CPL212	C Programming Lab	0	0	2	0	1	ES	30	L
		Total Credits					**20.5**			
	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, EEE BoS**	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.M.Renuga	**Dr.S.Padma**	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/ EEE, Second Semester B.E. Electrical and Computer Engineering students and Staff, COE

EFE III

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

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
		Theory courses								
1.	U23EF301	Signals and Systems	3	0	0	0	3	PC	45	T
2.	U23EF302	Electrical Machines	3	0	0	0	3	PC	45	T
3.	U23EE303	Electronic Devices and Circuits	3	0	0	0	3	PC	45	T
4.	U23EF303	Digital Electronics	3	0	0	0	3	PC	45	T
5.	U23EF304	Object-Oriented Programming in Java	3	0	0	0	3	PC	45	T
6.	U23EF305	Data Structures and Algorithms	2	0	2	0	3	PC	60	TL
7.	noc25-mg106	NPTEL : Design Thinking – A Primer	1	0	0	0	1	AC	15	T
		Practical courses								
8.	U23EF306	Electrical Machines Laboratory	0	0	3	0	1.5	PC	45	L
9.	U23EF307	Analog and Digital Circuits Laboratory	0	0	2	0	1	PC	30	L
10.	U23EF308	Object-Oriented Programming in Java Laboratory	0	0	2	0	1	PC	30	L
11.	U23GE301	Soft Skills and Aptitude-I	0	0	2	0	1	EEC	30	L
		Total Credits					**23.5**			

*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

Approved By

S.Padma	R.Shivakumar 25/6/25	J. Akilandeswari	
Chairperson, Electrical and Electronics Engineering BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.S.Padma	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/ EEE, Third Semester B.E. Electrical and Computer Engineering 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: Electrical and Computer Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	U23MAT401C	Probability and Statistical Methods	3	1	0	0	4	BS	60	TT
2.	U23EF401	Instrumentation Systems	3	0	0	0	3	PC	45	T
3.	U23EE403	Linear Integrated Circuits	3	0	2	0	4	PC	75	TL
4.	U23EF402	Microprocessor and Microcontrollers	3	0	0	0	3	PC	45	T
5.	U23EF403	Control systems	2	1	0	0	3	PC	45	TT
6.	U23EF404	Database Management systems	3	0	0	0	3	PC	45	T
7.	U23GE402	**Audit Course** - Essence of Indian Traditional Knowledge	2	0	0	0	0	AC	30	T
Practical courses										
8.	U23EF405	Control and Instrumentation Laboratory	0	0	2	0	1	PC	30	L
9.	U23EF406	Microprocessor and Microcontrollers Laboratory	0	0	2	2	2	PC	60	LP
10.	U23EF407	Database Management systems Laboratory	0	0	2	0	1	PC	30	L
11.	U23GE401	Soft Skills and Aptitude-II	0	0	2	0	1	EEC	30	L
Total Credits							25			

*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

S. Padma	R. Shivakumar 15-12-25	J. Akilandeswari	J. Akilandeswari
Chairperson, Electrical and Electronics Engineering BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.S.Padma	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/ Electrical and Electronics Engineering, Fourth Semester B.E. EFE 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: Electrical and Computer 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.	U23CHE104C	Chemistry For Electrical Engineering	3	0	0	0	3	BS	45	T
4.	U23PPR105	Problem Solving using Python Programming	3	0	0	0	3	ES	45	T
5.	U23EGR107	Engineering Graphics	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.	U23CHL111B	Chemistry Laboratory	0	0	2	0	1	BS	30	L
9.	U23PPL112	Python Programming Laboratory	0	0	2	0	1	ES	30	L
		Total Credits					19			
	Optional Language Courses**									
10.	U23OL1101	French	1	0	0	0	1	OL	15	T
11.	U23OL1102	German							15	T
12.	U23OL1103	Japanese							15	T
13.	U23OL1104	Korean							15	T
14.	U23OL1105	Hindi							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, EEE BoS**	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr. M. Renuga	**Dr.S.Padma**	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/ Electrical and Computer Engineering, First Semester B.E. EECE 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. / ELECTRICAL AND ELECTRONICS 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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		3	2						2	2	3	3
CO2	3	2		3	2						2	2	3	3
CO3	3	2		3	2						2	2	3	3
CO4	3	2		3	2						2	2	3	3
CO5	3	2		3	2						2	2	3	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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SALEM - 636 005.

U23CHE104C	CHEMISTRY FOR ELECTRICAL ENGINEERING (Common to Electrical and Electronics Engineering & Electrical and Computer 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:	Outline the principle of electrochemistry and its engineering applications.
CO2:	Describe the construction, working principle and applications of energy storage devices for electronic appliances.
CO3:	Analyse the types of polymers, polymerization reactions, polymerization techniques and fabrication methods of polymers for engineering applications.
CO4:	Explain the electrochemical processes carried out in electronic industries.
CO5:	Discuss the principle, advantages and applications of organic electronic materials in electronic device fabrication.

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
CO2	3	2					2							2
CO3	3	2					2							2
CO4	3	2					2							2
CO5	3	2					2							2

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: ELECTROCHEMISTRY — **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 by Pogendorff's method –

potentiometric titrations (redox – Fe^{2+} vs dichromate) – conductometric titrations (acid-base – HCl vs NaOH).
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 – Recycling methods of used batteries and conventional solar cells - Fuel Cells – Hydrogen-Oxygen fuel cell – Nano batteries- construction-working-advantages and applications.
Unit 03: ELECTROCHEMICAL PROCESSES IN ELECTRONIC INDUSTRIES **9 Hours**
Electroplating – Principle and process - plating parameters- current and energy efficiency - Electroplating of nickel - Fundamentals of electroless deposition – electroless plating of nickel, fabrication of PCB's - electrochemical etching of copper from PCBs - Anodizing - definition, principle and working methodology of aluminium anodizing process – Cyclic voltammetry- basic principles and applications - Sensors – definitions and examples.
Unit 04: POLYMER CHEMISTRY **9 Hours**
Nomenclature of 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 – Thermoplastic and Thermosetting Resins - Plastics – moulding constituents of plastics – moulding of plastics into articles-Injection, Compression and Blow moulding – Rubbers-types-applications-vulcanization of rubber.
Unit 05: 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 – Conducting polymers, types and applications – Organic Light Emitting Diodes (OLEDs) - construction-working principle and applications – Organic transistors- construction-working principle and applications in electronic Industries.

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	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.	Electroplating, Anodizing and Metal treatment", Hand book, NIIR board, 2004.
3.	Hagen Klauk, "Organic Electronics: Materials, Manufacturing and Applications", Wiley-VCH, 2006.
4.	A. Ravikrishnan, "Engineering Chemistry", Sri Krishna Publications, Chennai, 2017.

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Dr. M. RENUGA,
Professor & Head,
Department of Humanities & Languages
Sona College of Technology,
SALEM - 636 ...

U23CHL111B	CHEMISTRY LABORATORY (Common to Mechanical, EEE, EECE & FT 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:	Analyse the given water sample to determine the amount of hardness, alkalinity and analyse the quality of brass by estimating copper in brass solution.
CO2:	Estimate the amount of HCl in a given sample by pH metry, conductometry and estimate the amount of iron in a sample by potentiometry and spectrophotometry.
CO3:	Determine the molecular weight of water soluble polymer and estimate the amount of chromium in waste water.

Pre-requisite: Capable of handling pipette, burette, standard measuring flask and conical 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					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	Estimation of hardness of water sample by EDTA method.
2	Estimation of alkalinity of water sample by indicator method.
3	Estimation of copper in brass by EDTA method.
4	Estimation of HCl by pH metry.
5	Estimation of HCl by conductometry. (HCl vs NaOH)
6.	Estimation of mixture of acids by conductometry. (HCl + CH_3COOH vs NaOH)

7	Estimation of ferrous ion by potentiometric titration.	
8	Estimation of chromium prepared from electroplating sludge by Permanganometry.	
9	Determination of molecular weight of a polymer by viscosity measurements.	
10	Estimation of iron content in water by spectrophotometry.	
		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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U23EGR107	ENGINEERING GRAPHICS	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 (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

CONCEPTS AND CONVENTIONS - (Not for Examination).

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). **9 Hours**

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.

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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 and cone, when the axis is inclined to one of the principal planes and parallel to the other by change of position 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.

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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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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

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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)

HOD

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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: Electrical and Computer 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.	U23MAT202B	Transforms and Differential Equations	3	1	0	0	4	BS	60	TT
3.	U23PHY203D	Engineering Physics	3	0	0	0	3	BS	45	T
4.	U23EE201	Electrical Circuit Analysis	3	1	0	0	4	PC	60	TT
5.	U23CPR205	Programming in C	3	0	0	0	3	ES	45	T
6.	U23TAM201	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	0	1	HS	15	T
7.	U23GE201	Basic Aptitude -II	2	0	0	0	0	AC	30	T
	Practical courses									
8.	U23PHL210B	Engineering Physics Laboratory	0	0	2	0	1	BS	30	L
9.	U23EE202	Electrical Circuits Laboratory	0	0	3	0	1.5	PC	45	L
10.	U23CPL212	C Programming Lab	0	0	2	0	1	ES	30	L
		Total Credits					**20.5**			
	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, EEE BoS**	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.M.Renuga	**Dr.S.Padma**	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/ EEE, Second Semester B.E. Electrical and Computer Engineering 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	TRANSFORMS AND DIFFERENTIAL EQUATIONS (Common to EEE, ECE, BME, EFE and EXE)	L	T	P	J	C
U23MAT202B		3	1	0	0	4

Course Outcomes

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

CO1:	apply the classical methods to solve linear ordinary differential equations with constant coefficients.
CO2:	apply the Laplace transforms technique and its properties to solve ordinary differential equations.
CO3:	express a periodic signal as an infinite sum of sine and cosine wave components using Fourier series.
CO4:	apply the Fourier transform techniques to convert the signal in terms of the frequencies of the waves.
CO5:	find the general and singular solutions of linear and nonlinear 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 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 (EEE,ECE EFE, EXE)	PSO2 (EEE, BME & EFE)	PSO3 (BME)
CO1	3	3	3	3	2							2	3	3	1
CO2	3	3	3	3	2							2	3	3	1
CO3	3	3	3	3	2							2	3	3	1
CO4	3	3	3	3	2							2	3	3	1
CO5	3	3	3	3	2							2	3	3	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

Unit 01	ORDINARY DIFFERENTIAL EQUATIONS	12 Hours

Higher order linear ordinary differential equations with constant coefficients – Cauchy's and Legendre's linear ordinary differential equations – Method of variation of parameters.

Unit 02	LAPLACE TRANSFORMS	12 Hours
Laplace transform: Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse function – Initial and final value theorems – Transform of periodic functions. **Inverse Laplace transform:** Standard results – Statement of convolution theorem and its applications – Solution of second order linear ordinary differential equations with constant coefficients using Laplace transform.		
Unit 03	**FOURIER SERIES**	**12 Hours**
General Fourier series – Dirichlet's conditions – Change of intervals – Odd and even functions – Half range sine and cosine series – Root mean square – Parseval's identity – Harmonic analysis.		
Unit 04	**FOURIER TRANSFORMS**	**12 Hours**
Statement of Fourier integral theorem – Infinite Complex Fourier transform pair and their Properties – Infinite Fourier sine and cosine transforms pair and their properties –Transforms of simple functions – Parseval's identity.		
Unit 05	**PARTIAL DIFFERENTIAL EQUATIONS**	**12 Hours**
Formation of partial differential equations – Lagrange's partial differential equation – Clairaut's form of partial differential equations – Second order linear partial differential equation with constant coefficients.		

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

TEXT BOOKS:

1. T. Veerarajan, "Transforms and Partial Differential Equations", McGraw Hill Publishers, 3rd Edition, 2016.
2. T. Veerarajan, "Engineering Mathematics for Semesters I & II", McGraw Hill Publishers, 1st Edition, 2019.

REFERENCE BOOKS:

1. E. Kreyszig, "Advanced Engineering Mathematics", Wiley Publishers, 10th Edition, Reprint, 2017.
2. C. Prasad and R. Garg, "Advanced Engineering Mathematics", Khanna Publishers, 1st Edition, 2018.
3. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, 2018.

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BoS Date: 08. 07. 2023	HoD / Mathematics

U23PHY203D	ENGINEERING PHYSICS (Common to Electrical and Electronics Engineering & Electrical and Computer 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:	Analyse the relation between the arrangement of atoms and material properties.
CO2:	Discuss the dual nature of matter and radiation and the application of the 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 of atomic physics, optics, and electricity.

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
CO 1	3	2	-	-	-	2	2	-	-	2	-	1	-	2
CO 2	3	2	-	-	-	2	2	-	-	2	-	1	-	2
CO 3	3	2	-	-	-	2	2	-	-	2	-	1	-	2
CO 4	3	2	-	-	-	2	2	-	-	2	-	1	-	2
CO 5	3	2	-	-	-	2	2	-	-	2	-	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)	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 Uncertainty Principle - Schrödinger'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 - Transmission 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**

TEXTBOOKS	
1.	M.N. Avadhanulu, P.G. Kshirsagar, "A Textbook of Engineering Physics", S. Chand & Company Ltd, New Delhi 2014.
2.	B 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.

27.1.2025

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U23PHL210B	ENGINEERING PHYSICS LABORATORY (Common to I Year B.E. Electrical and Electronics Engineering & Electrical and Computer Engineering)	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, able to handle interferometer.

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 the wavelength of a diode laser.
4	Determination of particle size of lycopodium powder using diode laser.
5	Determination of acceptance angle and numerical aperture of an optical fibre using diode laser.

6	Determination of coefficient of viscosity of liquid by Poiseuille's method.	
7	Determination of wavelength of mercury spectrum using spectrometer.	
8	Determination of the thermal conductivity of a bad conductor using Lee's Disc apparatus.	
9	Determination of band gap of the given semiconductor diode.	
10	Determination of specific resistance of a given wire using Carey Foster's bridge.	
		TOTAL : 30 HOURS

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U23EE201	ELECTRICAL CIRCUIT ANALYSIS (Common to EEE & EFE)	L	T	P	J	C
		3	1	0	0	4

Course Outcomes

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

CO1:	solve AC & DC circuits using Ohm's law and Kirchhoff's laws.
CO2:	apply the concepts of different theorems to solve complex problems in DC circuits
CO3:	analyze the steady state behaviour of series and parallel RL, RC, and RLC circuits.
CO4:	analyze the transient behavior of RL, RC, and RLC circuits with step and sinusoidal excitations.
CO5:	analyze the three-phase balanced and unbalanced systems in star & delta configurations.

Pre-requisite:

- Linear Algebra and Calculus with MATLAB

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	2	2		2						3	3	3
CO2	3	3	2	2		2						3	3	3
CO3	3	3	2	2		2						3	3	3
CO4	3	3	2	2		2						3	3	3
CO5	3	3	2	2		2						3	3	3

Course Assessment methods

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

Unit 01: DC AND AC FUNDAMENTALS — **12 Hours**

Introduction – Voltage, Current, Power and Energy – Circuit Elements – Energy Sources – Ohm's law – Kirchhoff's Laws – R, L & C in series and Parallel – Voltage Division – Current Division – Star-Delta Transformation – Source transformations – Sine Wave Equation – Terminologies – RMS Value, Average Value, Form factor and Peak factor for Sine Waveform.

Unit 02: DC NETWORK ANALYSIS — **12 Hours**

Mesh Analysis — Nodal analysis — Superposition Theorem – Thevenin's Theorem – Norton's Theorem – Maximum Power Transfer Theorem –Reciprocity Theorem.

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Unit 03: AC NETWORK ANALYSIS	12 Hours
RL, RC and RLC - Series and Parallel circuits - Impedance, Current, Voltage, Power and Power Factor – Impedance Triangle-Power Triangle - RLC Series and Parallel Resonance-resonant frequency-Q factor-Bandwidth.	

Unit 04: CIRCUIT TRANSIENT ANALYSIS	12 Hours
Introduction – transient response of RL and RC for step and sinusoidal inputs –transient response of RLC series circuit for step input using Laplace transform method. (only qualitative treatment for sinusoidal input)	

Unit 05: THREE PHASE CIRCUITS	12 Hours
Polyphase Systems – Advantages of a Three-Phase System – Generation of Three-Phase Voltages - Phase Sequence – Voltage, Current, and Power in a Star Connected and Delta-Connected System – Three-Phase Balanced & Unbalanced loads — Power and power factor Measurement by two wattmeter method.	

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

TEXT BOOKS

1. Shyam Mohan S.P., Sudhakar A, "Circuits and Network Analysis & Synthesis", Tata McGraw Hill, 5th edition, 2015.
2. V N Mittle and Arvind Mittal, "Basic Electrical Engineering", McGraw Hill, 2nd edition, 2018.

REFERENCES

1. Charles K Alexander, Matthew Sadiku, Fundamentals of Electric Circuits, McGraw Hill Education, 7th edition, 2022.
2. William Hayt, Jack Hemmerly, Jaime Phillips, Steven Durbin, "Engineering Circuit Analysis", Mc Graw Hill Education, 9th edition, 2020.
3. Ravish. R. Singh, Network Analysis &Synthesis, McGraw Education, 2nd Edition, 2019.
4. Arumugam M and Premkumaran, "Electric Circuit Theory", Khanna Publishers, 5th Edition, 2000.

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U23EE202	ELECTRICAL CIRCUITS LABORATORY (Common to EEE & EFE)	L	T	P	J	C
		0	0	3	0	1.5

Course Outcomes

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

CO1:	analyze the basic laws and theorems of electric circuits.
CO2:	analyze the single phase and three phase circuits.
CO3:	design and analyse a circuit for specific application.

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	2	2	2	2			3	2	2	3	3	3
CO2	3	3	2	2	2	2			3	2	2	3	3	3
CO3	3	3	2	2	2	2			3	2	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

Students may use LTSPICE / TinkerCad tool for simulating the below experiments.

List of Experiments:

1. Verification of Ohm's law and Kirchoff's laws.
2. Verification of Superposition theorem.
3. Verification of Thevenin's theorem.
4. Verification of Norton's theorem.
5. Verification of Maximum power transfer theorem.
6. Verification of Reciprocity theorem.
7. Calculation of Resonant Frequency, Bandwidth and Q factor for RLC Circuits.
8. Determination of RMS Value, Average Value, Form factor and Peak factor for Sinusoidal Waveform.
9. Simulate the transient behaviour of RL and RC circuits for various inputs.
10. Simulate the transient behaviour of RLC circuits for various inputs.
11. Measurement of voltage, current and power for a 3 phase load.
12. Power and power factor measurements by two wattmeter method.

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

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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	PO9	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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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 பிரகரம்). 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,
Professor & Head,
Department of Humanities & Languages,
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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Department of Humanities & Languages,
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LEM - 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.

S. Anita 6/02/2024

Dr.S.Anita
Professor & Head
Department of Training

Dr. S. ANITA
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SONA COLLEGE OF TECHNOLOGY,
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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

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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.

EFE III

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

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
		Theory courses								
1.	U23EF301	Signals and Systems	3	0	0	0	3	PC	45	T
2.	U23EF302	Electrical Machines	3	0	0	0	3	PC	45	T
3.	U23EE303	Electronic Devices and Circuits	3	0	0	0	3	PC	45	T
4.	U23EF303	Digital Electronics	3	0	0	0	3	PC	45	T
5.	U23EF304	Object-Oriented Programming in Java	3	0	0	0	3	PC	45	T
6.	U23EF305	Data Structures and Algorithms	2	0	2	0	3	PC	60	TL
7.	noc25-mg106	NPTEL : Design Thinking – A Primer	1	0	0	0	1	AC	15	T
		Practical courses								
8.	U23EF306	Electrical Machines Laboratory	0	0	3	0	1.5	PC	45	L
9.	U23EF307	Analog and Digital Circuits Laboratory	0	0	2	0	1	PC	30	L
10.	U23EF308	Object-Oriented Programming in Java Laboratory	0	0	2	0	1	PC	30	L
11.	U23GE301	Soft Skills and Aptitude-I	0	0	2	0	1	EEC	30	L
		Total Credits					**23.5**			

*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

Approved By

S.Padma	R.Shivakumar 25/6/25	J. Akilandeswari	
Chairperson, Electrical and Electronics Engineering BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.S.Padma	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-

HOD/ EEE, Third Semester B.E. Electrical and Computer Engineering Students and Staff, COE

U23EF301	SIGNALS AND SYSTEMS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	find the type of signals and Systems based on their classification.
CO2:	perform Laplace transform & Fourier transform on continuous time signals and systems.
CO3:	apply Z-transform, DTFT and their properties for the analysis of discrete time systems.
CO4:	analyse LTI systems in the time domain and various transform domains.
CO5:	analyse various discrete Fourier transforms properties.

Pre-requisite:

Engineering 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	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	3	2	1	1	1	2	1	3	3	3
CO2	3	3	2	3	3	2	1	1	1	2	1	3	3	3
CO3	3	3	2	3	3	2	1	1	1	2	1	3	3	3
CO4	3	3	2	3	3	2	1	1	1	2	1	3	3	3
CO5	3	3	2	3	3	2	1	1	1	2	1	3	3	3

Course Assessment methods

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

Unit 01: CLASSIFICATION OF SIGNALS AND SYSTEMS — **9 Hours**

Continuous Time signals (CT signals) – Discrete Time signals (DT signals) – step, ramp, pulse, impulse, sinusoidal, exponential, classification of CT and DT signals –periodic & aperiodic signals, deterministic & random signals, energy & power signals – CT systems and DT systems classification of systems – static & dynamic, linear & nonlinear, time-variant & time-invariant, causal & non-causal, stable & unstable systems.

Unit 02: ANALYSIS OF CONTINUOUS TIME SIGNALS AND LINEAR TIME INVARIENT (LTIV) SYSTEMS — **9 Hours**

Fourier and Laplace transforms in CT Signal analysis – Fourier and Laplace transforms in analysis of CT systems – Dirichlet's Conditions - Properties of Fourier and Laplace Transform s - Initial Value, Final Value and Parseval's Theorems.

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Salem-636 005. Tamil Nadu.

Unit 03: ANALYSIS OF DISCRETE TIME SIGNALS				9 Hours
Baseband sampling – Sampling Theorem for Low pass Signals - under sampling - Nyquist Rate and Nyquist Interval - Discrete Time Fourier Transform (DTFT) – properties of DTFT – Z transform – properties of Z transform.				
Unit 04: LINEAR TIME INVARIANT DISCRETE TIME SYSTEMS				**9 Hours**
Difference equations – Block diagram representation - Direct form I and Direct Form II structures – impulse response – convolution sum – discrete Fourier and Z transform analysis – Magnitude / Phase Transfer Function using Fourier Transform – Pole-Zero Plots.				
Unit 05: DISCRETE TRANSFORMS				**9 Hours**
Discrete Fourier Transform (DFT) – definition – properties, computation of Discrete Fourier Transform (DFT) using Fast Fourier Transform (FFT) algorithm – Decimation in Time (DIT) domain and Decimation in Frequency (DIF) domain – Fast Fourier Transform (FFT) using radix-2 – Butterfly structure – computation of Inverse Discrete Fourier Transform (IDFT) using DFT- Architecture of TMS320C54X Processor.				
Theory: 45 Hrs	**Tutorial: –**	**Practical: –**	**Project:–**	**Total Hours: 45 Hrs**

TEXT BOOKS	
1.	Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson Education, Reprint 2019.
2.	Edward W Kamen& Bonnie's Heck, "Fundamentals of Signals and Systems using web and MATLAB", Pearson Education, 2007.
REFERENCES	
1.	H.P.Hsu, Rakesh Ranjan, "Signals and Systems", Schaum's Outlines, Tata McGraw Hill, Indian Reprint, 2007.
2.	P. Ramesh Babu, "Digital signal Processing", Scitech Publication, 7th edition, 2018.
3.	B. P. Lathi, "Principles of Linear Systems and Signals", 3nd Edition, Oxford, 2017.
4.	Anand Kumar A, "Signals and systems", PHI Learning Private Limited, Third Edition, 2013.

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U23EF302	ELECTRICAL MACHINES	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	select a suitable dc machine for the given application, load characteristics.
CO2	explain the operation of single and three phase transformers and analyse the performance.
CO3	explain the operation, voltage regulation of synchronous generator and synchronous motor.
CO4	obtain the performance, starting of three phase induction motor.
CO5	obtain the performance of single-phase induction motor.

Pre-requisite:

Engineering physics, Electric circuit analysis

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	2	2	2	1	1	2	1	3	3	3
CO2	3	3	3	3	2	2	2	1	1	2	1	3	3	3
CO3	3	3	3	3	2	2	2	1	1	2	1	3	3	3
CO4	3	3	3	3	2	2	2	1	1	2	1	3	3	3
CO5	3	3	3	3	2	2	2	1	1	2	1	3	3	3

Course Assessment methods

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

Unit 01: DC Machines — **9 Hours**

DC Generator: constructional details – principle of operation – armature winding - EMF equation – methods of excitation - separate and self - excitation methods – no load and load characteristics.

DC Motor: principle of operation – types of DC motors - torque equation – electrical and mechanical characteristics of shunt, series and compound motors – DC motor starters.

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Unit 02: Transformers	9 Hours
Single phase transformer - principle of operation – parts and construction – classification of transformers – EMF equation – transformation ratio – transformer on no load and load – equivalent circuit – voltage regulation – losses and efficiency - construction of autotransformer - construction of three phase transformer - three phase transformer connections: star-star, star-delta, delta-delta, delta-star.	
Unit 03: Synchronous Machines	**9 Hours**
Synchronous Generator: principle of operation - constructional details – types of rotors – armature windings – types of armature winding - EMF equation – alternator on load – equivalent circuit - voltage regulation of alternator by synchronous impedance (EMF) method. **Synchronous Motor:** principle of operation – starting methods – power flow – torque angle characteristics - expression for back EMF – construction of V and inverted V curves - hunting.	
Unit 04: Three phase induction motor	**9 Hours**
Constructional details – squirrel cage rotor – wound rotor - principle of operation – slip and its importance – torque equations – condition for maximum torque – torque-slip characteristics - power and efficiency - equivalent circuit – crawling and cogging - load test of three phase induction motor - starters – types of starters - stator resistance, auto-transformer, star-delta, DOL starters.	
Unit 05: Single phase induction motor	**9 Hours**
Constructional details - principle of operation – types of single-phase induction motor and torque speed characteristics – split phase induction motor – capacitor start induction motor – capacitor start capacitor run induction motor – equivalent circuit of single-phase induction motor with core and without core loss – performance calculation – applications.	

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

TEXT BOOKS

1.	B.L.Theraja and A.K.Theraja, "A Textbook of Electrical Technology Volume 2 : AC and DC Machines" (In S.I. Units) - S.Chand Publisher, 24th Edition Paperback , 2024.
2.	D.P.Kothari and I.J.Nagrath, "Electric Machines", Tata McGraw Hill Publishing Company Ltd, Fifth Edition, Published: August 8, 2017

REFERENCES

1.	A.E.Fitzgerald, Charles Kingsley, Stephen.D.Umans, "Electric Machinery", Tata McGraw Hill Publishing Company Ltd, 2013.
2.	K.Murugesh Kumar, "Induction & Synchronous Machines", Vikas Publishing House Pvt. Ltd, 2000.
3.	M.V Deshpande, "Electrical Machines", Wheeler Publishing, 2011.
4.	M. G. Say, "Performance and Design of AC Machines", CBS Publishers, 3rd edition, 2002.
5.	ASHFAQ HUSAIN, "Electric Machines" Dhanpat Rai & CO.(P) LTD., 3rd edition, 2016

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U23EE303	ELECTRONIC DEVICES AND CIRCUITS	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	Analyze the characteristics of P-N junction diode and special purpose diodes.
CO2	Design small signal models for different configurations of transistor.
CO3	Discuss the I/O characteristics of various converter switches.
CO4	Explain different types of large signal and feedback amplifiers.
CO5	Illustrate different types of multistage amplifiers and oscillators.

Pre-requisite: Engineering 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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2		2	2			2		3	3
CO2	3	3	3	3	2		2	2			2		3	3
CO3	3	3	3	2	3		2	2			2		3	2
CO4	3	3	3	2	2		2	2			2		3	2
CO5	3	3	3	3	2		2	2			2		3	3

Course Assessment methods

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

Unit 01: P-N JUNCTION DIODES — **9 Hours**

P-N Junction diode – Structure, operation and V-I characteristics, Diode current equation, switching characteristics, diffusion and transition capacitance, - Diode rectifiers – working of half wave and full wave rectifiers, diode clipper and clamper circuits – Zener diode – Structure, operation and V-I characteristics – Zener as a voltage regulator.

Special purpose electronic devices: Principle of operation and Characteristics of Tunnel Diode, Varactor Diode, photo diode and LED and their applications.

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Unit 02: TRANSISTOR AND ITS ANALYSIS	9 Hours
Bipolar Junction Transistor – structure, operation, CB, CE, CC configurations and I/O characteristics, switching characteristics – Transistor as an amplifier – current amplification factors - Analysis of h-parameters for CE, CB, CC configurations with input impedance, forward current gain, reverse voltage gain and output admittance – Comparison – Bias stability – dc load line, ac load line, operating point, stability factor, thermal runaway – Methods of transistor biasing – Bias compensation.	
Unit 03: FIELD EFFECT TRANSISTORS AND CONVERTER SWITCHES	**9 Hours**
JFET - Construction, principle of operation and VI characteristics, Pinch- off voltage. MOSFET - Construction, principle of Operation in Enhancement and Depletion modes, VI characteristics, Comparison of BJT, JFET and MOSFET. IGBT - Construction, principle of Operation in Enhancement and Depletion modes, VI characteristics. Construction, principle of operation and VI characteristics – SCR, DIAC, TRIAC – SCR triggering circuits.	
Unit 04: LARGE SIGNAL AND FEEDBACK AMPIFIERS	**9 Hours**
Differential amplifier – Common mode and Difference mode analysis - analysis of Class A, B, C and AB Power amplifiers — Feedback Amplifiers - Concept of feedback, General characteristics of negative feedback amplifiers - Effect of feedback on I/O resistance- types of negative feedback amplifiers – stability of feedback amplifier.	
Unit 05: MULTISTAGE AMPLIFIERS AND OSCILLATORS	**9 Hours**
Introduction – different coupling schemes in amplifiers – operation, advantages and disadvantages of RC coupled, transformer coupled, cascade, direct coupled and darlington amplifiers - Condition for Oscillations – UJT relaxation oscillator - RC phase shift Oscillators with transistor and FET- Hartley and Colpitts Oscillators - Wein-Bridge Oscillator - Crystal Oscillator- Frequency and Amplitude Stability Oscillators.	

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

TEXT BOOKS

1. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGraw Hill, 2022
2. Electronic Devices and Circuits Theory, Boylsted, Prentice Hall Publications, 2021

REFERENCES

1. Electronic Devices and Circuits, S.Salivahanan, N.Suresh kumar, McGraw Hill, 2022
2. David A. Bell, "Electronic devices and circuits", Oxford University higher education, 5th edition 2008.
3. Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10th Edition, 2017.
4. Balbir Kumar, Shail.B.Jain, "Electronic devices and circuits" PHI learning private limited, 2nd edition, 2021.

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U23EF303	DIGITAL ELECTRONICS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes:

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

CO1:	simplify the Boolean functions & compare the properties of digital families.
CO2:	design combinational logic circuits and realize them using logic gates and PLDs.
CO3:	design sequential logic circuits and realize them using flip-flops and logic gates.
CO4:	model combinational circuits in Verilog using gate-level and dataflow modelling with testbenches.
CO5:	model sequential circuits in Verilog using behavioral modelling and verify using testbenches.

Pre-requisite: Basic mathematics; Electronic devices

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	2	2	1	-	-	-	-	1	-	1	3	3
CO2	3	3	3	2	2	-	-	-	-	2	-	1	3	3
CO3	3	3	3	2	2	-	-	-	-	2	-	1	3	3
CO4	3	2	2	2	3	-	-	-	-	1	-	2	3	3
CO5	3	2	2	2	3	-	-	-	-	1	-	2	3	3

Course Assessment Methods

Direct Assessment (80%)		Indirect Assessment (20%)
CIE test I (9) CIE test II (9) CIE test III (10) Assignment/seminar/Quiz (5)	Objectives Test (7) Total CIE: 40 marks Semester End Examination (60)	Course End Survey

Unit 1: Boolean Algebra and Logic Families — **9 Hours**

Number systems: Binary, Octal, and Hexadecimal – Binary codes: Gray and BCD – Logic gates – Boolean algebra: Laws, theorems and simplification techniques – Minterms and Maxterms – Minimization using K-Map (up to 5 variables). Logic families: Definitions, Types – TTL, ECL, CMOS – Comparison.

Unit 2: Combinational Logic Circuits and PLDs — **9 Hours**

Analysis and design procedure – Design of adders and subtractors – Code converters (Binary, Gray & BCD) – Implementation of combinational logics using decoders, demultiplexers and multiplexers - Overview of memories - Programmable Logic Devices: PROM, PAL, and PLA – Implementation of Boolean functions – Comparison.

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Unit 3: Sequential Logic Circuits	9 Hours
Flip-flops: SR, JK, D, and T – Conversion of flip-flops – Design using Moore and Mealy models – State diagram and State reduction – Sequence detectors - Synchronous counters (Up, Down, Modulo and Sequence) – Ripple counters (Up, Down, and Modulo) – Shift registers (SISO, SIPO, PISO, and PIPO) - Overview of Races and Hazards in digital circuits.	
Unit 4: Verilog HDL for Combinational Circuits	**9 Hours**
Introduction to HDL – Verilog HDL basics – Modules, ports and data types – Continuous assignments – Testbench – Gate-level modelling: Implementation of logic circuits – Tri-state logic – Dataflow modelling: Implementation of logic gates, Boolean expressions, adder, subtractor, decoder, and multiplexer.	
Unit 5: Verilog HDL for Sequential Circuits	**9 Hours**
User-defined primitives and Truth table modelling for combinational and sequential circuits – Procedural assignments – Testbench for sequential circuits – Behavioral modelling: Implementation of flip-flops, shift registers, and ripple counters – State diagram-based modelling.	

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

TEXTBOOKS

1. Morris Mano M and Michael D. Ciletti, "Digital Design", Pearson Education, 6th Edition, 2018.
2. Anand Kumar A, "Fundamentals of Digital Circuits", PHI Learning, 4th Edition, 2018.

REFERENCES

1. Ananda Natarajan R, "Digital Design", PHI Learning, 2015.
2. Thomas L. Floyd, "Digital Fundamentals", Pearson India, 11th Edition, 2018.
3. Joseph Cavanagh, "Verilog HDL Design Examples", CRC Press, 1st edition, 2018.
4. Bhasker J, "A Verilog HDL Primer", BS Publications, 3rd Edition, 2008.

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U23EF304	OBJECT - ORIENTED PROGRAMMING IN JAVA	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1	apply OOP principles like encapsulation, inheritance, and polymorphism in software design.
CO2	develop modular programs using interfaces, abstract classes, and packages.
CO3	implement robust Java applications with exception handling and basic multithreading.
CO4	apply collection frameworks and data structures to efficiently manage dynamic data.
CO5	perform file operations and process data streams using Java I/O and Streams API.

Pre-requisite:

Programming in C

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	1	3	3	2	3	1	1	1	2	1	1
CO2	3	2	2	1	3	3	3	3	2	1	3	3	2	1
CO3	3	2	2	1	3	3	3	3	2	1	3	1	1	1
CO4	2	2	3	1	3	3	3	3	2	1	3	1	1	1
CO5	2	2	3	1	3	3	3	3	2	1	3	1	1	2

Course Assessment methods

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

Unit 01: INTRODUCTION — **9 Hours**

Object Oriented Programming Concepts - Java Fundamentals: Structure of Java Program, Data Types, Arrays, Type Conversion - Class and Objects, Methods, Constructors - Memory Management, "this" keyword, Access Specifier - Abstraction, Encapsulation, Static Members.

Unit 02: INHERITANCE, INTERFACE AND POLYMORPHISM — **9 Hours**

Aggregation and Association - Inheritance: Types of Inheritance - Single, Multilevel, Hierarchical - Interfaces: Implementation and Usage - Polymorphism: Method Overloading and Method Overriding - Abstract Classes and Methods - Final Keyword, Wrapper Classes.

Unit 03: EXCEPTION HANDLING AND BASIC MULTITHREADING — **9 Hours**

Exception Handling: Built-in Exceptions, Custom Exceptions - Packages and Modularization - Basics of Multithreading: Thread Class, Runnable Interface, Thread Lifecycle (Introduction only), Synchronization Basics.

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Unit 04: COLLECTION FRAMEWORK AND DATA STRUCTURES	9 Hours
String Handling: String, String Builder, String Buffer, Regular Expressions - Generic Classes and Methods - Collection Framework: List (Array List, Linked List), Set (Hash Set, Tree Set), Map (Hash Map, Tree Map), Queue (Priority Queue, Deque) - Data Structures using Collections: Stack, Queue, Linked List implementations - Iterators and Collections Utility Classes.	
Unit 05: JAVA I/O & STREAMS API	**9 Hours**
Basics of Java I/O: Byte Streams (File Input Stream, File Output Stream), Data Streams (Data Input Stream, Data Output Stream) - Serialization and Deserialization of Objects - Streams API (Java 8+): Introduction, filter, map, reduce, collect - Functional Interfaces & Lambda Expressions (briefly with Streams).	

Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	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 Fundamentas, 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. Balagurusamy, "Programming with Java", Second Edition, TMH , 2009.
4. S. Malhotra and S. Choudhary, "Programming in Java", Second Edition, Oxford Universities Press 2018.

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U23EF305	DATA STRUCTURES AND ALGORITHMS	L	T	P	J	C
		2	0	2	0	3

Course Outcomes

At the end of the course, the students 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: Programming in C

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	1	1	1	1	1	1	2	1	2	3	3
CO2	2	2	2	2	3	2	1	1	2	1	1	2	3	2
CO3	3	2	3	1	3	1	1	1	2	1	1	1	3	3
CO4	2	3	3	2	3	1	1	1	1	1	1	1	2	3
CO5	2	2	2	2	2	1	1	1	1	1	1	2	2	2

Course Assessment methods

Direct		Indirect
CIE test I (10) – Theory CIE test II (10) – Theory CIE test III (10) – Theory CIE test IV (15) – Laboratory	Assignment/Quiz/Seminar (5) Total CIE (Internal) : **50 marks** Semester End Examination : **50 marks** [SEE – Theory (25 marks), Lab (25 marks)]	**Course end survey**

Unit 01: LINEAR DATA STRUCTURE – LIST — **6 Hours**

Abstract Data Types (ADT)- List ADT - Linked List implementation – Singly linked list- Doubly linked List- Circular linked list- - Applications of list.

Unit 02: LINEAR DATA STRUCTURE – STACKS AND QUEUES — **6 Hours**

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

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UNIT 03: - NON-LINEAR DATA STRUCTURES – TREES	6 Hours
Basic tree concepts- Traversals - Binary Trees – Expression trees- Binary search trees -AVL Trees – Heap- Applications of trees.	
Unit 04: NON-LINEAR DATA STRUCTURES – GRAPHS	**6 Hours**
Graphs- Representations of graphs - Graph Traversal: Depth first Traversal- Breadth first Traversal- Shortest Path Algorithms: Dijkstra's Algorithm- Minimum Spanning Tree: Prim's Algorithm, Kruskal's Algorithm- Applications of Graphs.	
Unit 05: SEARCHING, SORTING AND HASHING TECHNIQUES	**6 Hours**
Searching Techniques: Linear Search, Binary Search – Sorting Techniques: Bubble Sort, Insertion Sort, Merge sort- Hashing - Hash Function - Separate Chaining – Open Addressing - Linear Probing- Quadratic Probing –Rehashing.	

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

TEXT BOOKS

1. Mark Allen Weiss, "Data structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2020.
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest. Clifford stein,"Introduction to Algorithms", 3rd Edition, MIT press, 2022.

REFERENCES

1. Jean Paul Tremblay and Sorenson, "An Introduction to Data Structures with Applications", 2nd Edition, McGraw Hill Publishing Company, New Delhi, 2017.
2. Horowitz Sahni, Anderson Freed, "Fundamentals of Data Structures in C", 2nd Edition, Silicon Press, New Jersey, 2011.
3. Langsam Y.M., Augenstein J. and Tanenbaum A.M., "Data Structures using C and C++", 2nd Edition, Pearson Education, 2015.
4. Alfred V.Aho, J.E.Hopcroft and J.D. Ullman, "Data Structures and Algorithms" 14th Impression Pearson Education, 2013.

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LIST OF EXPERIMENTS

1. Implementation of singly linked list.
2. Implementation of doubly linked list.
3. Implementation of Stack and its operations.
4. Implementation of Queue and its operations.
5. Implementation of Binary Search Tree.
6. Implementation of Heap.
7. Implementation of graphs using BFS and DFS.
8. Implementation of Prim's algorithm.
9. Implementation of Kruskal's algorithm.
10. Implementation of sorting techniques.

Total: 30 Hours

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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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U23EF306	ELECTRICAL MACHINES LABORATORY	L	T	P	J	C
		0	0	3	0	1.5

Course Outcomes

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

CO1	Analyse the performance characteristics of DC machines and transformer.
CO2	determine the voltage regulation of three phase alternator using EMF, inductive and capacitive load methods, analyse the performance of three phase induction motor and single-phase induction motor.
CO3	Analyse the performance of DC machines and synchronous machines and induction machines for various applications in the industry.

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	2	2	2	1	1	2	1	3	3	3
CO2	3	3	3	3	2	2	2	1	1	2	1	3	3	3
CO3	3	3	3	3	2	2	2	1	1	2	1	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (15) Quiz I (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. Open circuit and load characteristics of separately excited DC shunt generator.
2. Load test on DC shunt motor
3. Load test on DC series motor
4. Load test on DC compound motor.
5. Speed control of DC shunt motor by field and armature control method.
6. Load test on single-phase transformer.
7. Regulation of three-phase alternator by synchronous impedance (EMF) method.
8. Load test on three-phase alternator.
9. Load test on three phase induction motor.
10. Load test on single-phase induction motor.

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

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U23EF307	ANALOG AND DIGITAL CIRCUITS LABORATORY	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:	analyse the characteristics of diodes and transistors, and design rectifiers and oscillators.
CO2:	design and implement combinational and sequential digital logic circuits.
CO3:	integrate analog and digital circuit concepts to design functional electronic systems.

Pre-requisite: Basic Mathematics and Basic Electrical Engineering.

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	2	2	-	-	-	1	2	-	2	3	3
CO2	3	3	3	2	3	-	-	-	2	2	-	2	3	3
CO3	3	3	3	3	3	-	-	-	2	2	-	2	3	3

Course Assessment Methods

Direct Assessment (80%)		Indirect Assessment (20%)
CIE Test 1 (15) CIE Test 2 (15) Quiz 1 (5) Quiz 2 (5)	RTPS (10) Record (10) Total CIE: **60 marks** Semester End Examination: **40 marks**	Course End Survey

List of Experiments

Analog Circuits

1) Characteristics of PN junction diode and Zener diode.
2) Half-wave and Full-wave rectifier circuits using diodes.
3) Characteristics of CE and CB Configurations of BJT.
4) Characteristics of JFET and MOSFET.
5) Implementation of Phase Shift and Relaxation Oscillators.

Digital Circuits (Hardware Implementation and Verilog HDL code)

6) Implementation of Boolean functions using logic gates.
7) Implementation of adders and subtractors.
8) Conversion of D flip-flop to JK / T flip-flops.
9) Implementation of SISO & SIPO Shift Registers.
10) Implementation of asynchronous counters.

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

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U23EF308	OBJECT-ORIENTED PROGRAMMING IN JAVA LABORATORY	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:	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

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	3	2	2	3	1	3	2	3	3
CO2	3	3	3	3	3	3	2	3	3	1	3	2	3	3
CO3	3	3	3	3	3	3	2	3	3	1	3	2	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. Develop Java programs using basic syntax and control structures
   - Implement data types, operators, loops, and conditionals.
2. Create classes and objects with constructors
   - Use constructors, 'this' keyword, constructor overloading, and static members.
3. Implement encapsulation and abstraction
   - Demonstrate access specifiers, private data, and abstract classes.
4. Apply inheritance, interfaces, and polymorphism
   - Use single/multilevel inheritance, implement interfaces, and perform method overloading/overriding.
5. Handle exceptions and create user-defined exceptions
   - Apply try, catch, finally, throw, and custom exception classes.

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6. Implement basic multithreading in Java
   - Create threads using Thread and Runnable, and demonstrate basic synchronization.
7. Use generic classes and methods in Java.
   - Implement type-safe generics with custom classes and functions.
8. Explore the collection framework in Java.
   - Use ArrayList, LinkedList, HashMap, and HashSet.
9. Perform file I/O and object serialization
   - Read/write text files using streams and serialize/deserialize Java objects.
10. Use Streams API for data processing
   - Demonstrate map, filter, collect, and forEach operations.

Theory: --	Tutorial: --	Practical: 30 Hrs	Project:--	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 - 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. 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

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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: Electrical and Computer Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
Theory courses										
1.	U23MAT401C	Probability and Statistical Methods	3	1	0	0	4	BS	60	TT
2.	U23EF401	Instrumentation Systems	3	0	0	0	3	PC	45	T
3.	U23EE403	Linear Integrated Circuits	3	0	2	0	4	PC	75	TL
4.	U23EF402	Microprocessor and Microcontrollers	3	0	0	0	3	PC	45	T
5.	U23EF403	Control systems	2	1	0	0	3	PC	45	TT
6.	U23EF404	Database Management systems	3	0	0	0	3	PC	45	T
7.	U23GE402	**Audit Course** - Essence of Indian Traditional Knowledge	2	0	0	0	0	AC	30	T
Practical courses										
8.	U23EF405	Control and Instrumentation Laboratory	0	0	2	0	1	PC	30	L
9.	U23EF406	Microprocessor and Microcontrollers Laboratory	0	0	2	2	2	PC	60	LP
10.	U23EF407	Database Management systems Laboratory	0	0	2	0	1	PC	30	L
11.	U23GE401	Soft Skills and Aptitude-II	0	0	2	0	1	EEC	30	L
Total Credits							**25**			

*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

S.Padma	Shivakumar 15-12-25	J. Akilandeswari	J. Akilandeswari
Chairperson, Electrical and Electronics Engineering BoS	**Member Secretary, Academic Council**	**Dean-Academics**	**Chairperson, Academic Council & Principal**
Dr.S.Padma	**Dr.R.Shivakumar**	**Dr.J.Akilandeswari**	**Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/ Electrical and Electronics Engineering, Fourth Semester B.E. EFE Students and Staff, COE

SEMESTER – IV	PROBABILITY AND STATISTICAL METHODS	L	T	P	J	C
U23MAT401C	(Common to EEE, MCT and EFE)	3	1	0	0	4

COURSE OUTCOMES

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

CO1:	apply the concepts of measures of central tendency, dispersion to the given data and analyze the results.
CO2:	compute simple and partial correlation coefficients and analyse regression equations for estimation and prediction purposes.
CO3:	apply the concepts of random variables and their properties to generate the moments.
CO4:	fit the suitable distribution and its properties to the real world problems and interpret the results.
CO5:	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	P09	PO10	PO11	PO12	PSO1	PSO2
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	MEASURES OF CENTRAL TENDENCY AND DISPERSION	12 Hours

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 02	CORRELATION AND REGRESSION	12 Hours

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

Unit 03	ONE DIMENSIONAL RANDOM VARIABLE	12 Hours

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 04	THEORETICAL DISTRIBUTIONS	12 Hours
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 05	**TWO DIMENSIONAL RANDOM VARIABLES**	**12 Hours**
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 Hours: 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 Queuing Theory and Queuing 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.

B. E / B. TECH REGULATIONS 2023	HOD/ MATHEMATICS
BoS DATE: 14.06.2025	

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U23EF401	INSTRUMENTATION SYSTEMS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	analyze measurement systems by interpreting functional elements, static and dynamic characteristics, types of errors, statistical evaluation of data, and standards of calibration.
CO2:	apply the operating principles of electrical and electronic measuring instruments to evaluate voltage, current, power, and energy using analog, digital, and smart measurement systems.
CO3:	analyze DC and AC bridge circuits and grounding techniques to determine resistance, inductance, capacitance, earth resistance, and insulation resistance accurately.
CO4:	evaluate the performance of display devices, recording instruments, oscilloscopes, and special instruments used for renewable energy, wind measurement, and power quality analysis.
CO5:	select and apply appropriate transducers, sensors, and data acquisition elements to measure physical and electrical parameters in modern instrumentation systems.

Pre-requisite:

Electrical Circuit Analysis, Engineering Physics and 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	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	1							1	3	1
CO2	3	2	2	2	3	1						1	3	2
CO3	3	3	2	3	2	1						1	3	2
CO4	2	2	1	3	3	2	1					1	2	2
CO5	3	2	3	2	3	1	2					2	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 — **9 Hours**

Functional elements of an instrument – Static characteristics: True value, Static error, Static correction, Reproducibility, Drift, Repeatability, Noise, Signal to Noise Ratio, Accuracy and Precision, Sensitivity, Linearity, Threshold, Dead zone, Resolution. Dynamic characteristics: Speed of response, Fidelity, Measuring lag, and Dynamic error – Types of Errors: Gross error, Systematic error and Random error – Statistical Evaluation of Measurement data – Standards and Calibration.

Unit 02: ELECTRICAL AND ELECTRONICS INSTRUMENTS — **9 Hours**

Measuring Instruments and its Types - Moving coil instruments; PMMC - Moving iron: Attraction and Repulsion type instruments - Dynamometer type instruments, Torque equation. - Single phase induction type energy meter - Extension of Voltmeter and Ammeter – Digital Meters: DC Voltmeter – Multimeter - Phasor

Measurement Unit - Smart Energy Meter and Net Metering for energy measurements.	
Unit 03: BRIDGES & GROUNDING TECHNIQUES	**9 Hours**
DC bridges: Wheatstone bridge, Kelvin double bridge – AC bridges: Anderson, Schering, Wein bridge – grounding techniques – Measurement of earth resistance: Fall of potential method and Earth tester method – Megger.	
Unit 04: DISPLAY DEVICES & SPECIAL INSTRUMENTS	**9 Hours**
LED, DOT Matrix and LCD display - Digital Storage Oscilloscope (DSO)- Recorders: Strip chart recorder and X-Y recorder – Special instruments: measurement of solar radiation : Pyranometer and Pyrheliometer.- Wind Measurement: Hot wire Anemometer, Propeller type Anemometer, Laser Doppler Anemometer, Ultrasonic Anemometer – Power Quality Analyzer	
Unit 05: TRANSDUCERS & SENSORS	**9 Hours**
Transducer - Classification of transducers – Selection of transducers – Resistive Transducers: Strain Gauge, Thermistor & RTD, Capacitive Transducer and Inductive Transducer: LVDT - Measurement of Temperature – RTD, Thermistors and Thermocouples – Piezoelectric, Hall effect, optical and digital transducers – Elements of data acquisition system – Introduction to Microsensors (MEMS sensors), Nanosensors (NEMS sensors), Smart sensors.	

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

TEXT BOOKS

1. A.K.Sawhney, "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 7th Edition, 2015.
2. R.K.Rajput, "Electrical Measurements and Measuring Instruments", S.Chand and Company Pvt. Ltd., Second Edition, 2019.

REFERENCES

1. Albert D. Helfrick and William D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI Learning Pvt. Ltd., 2020
2. E.O.Doebelin, "Measurement Systems Application and Design", Tata McGraw Hill Publishing Company, 2016.
3. D.V.S.Moorthy, "Transducers and Instrumentation", Prentice Hall of India Pvt Ltd, 2008.
4. J.B.Gupta, "A Course in Electronic and Electrical Measurements", S. K. Kataria & Sons, Delhi, 2008.

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U23EE403	LINEAR INTEGRATED CIRCUITS	L	T	P	J	C
		3	0	2	0	4

Course Outcomes

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

CO1	explain the process of IC Fabrication for active and passive components.
CO2	explain the DC & AC characteristics of Operational Amplifier.
CO3	analyse an analog circuit using operational amplifiers.
CO4	design an electronic system using special ICs for a specific application.
CO5	design a power supply system using voltage regulators.

Pre-requisite:

Electronic Devices and Circuits

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	2	3	3	2	3	1	1	2	1	3	3	3
CO2	3	3	3	2	2	2	3	1	1	2	1	3	3	3
CO3	3	3	2	3	3	2	3	1	1	2	1	3	3	3
CO4	3	3	3	2	1	1	3	1	1	2	1	3	3	3
CO5	3	3	2	3	3	2	3	1	1	2	1	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) – Laboratory Attendance (5)	Assignment / Quiz/ Seminar (5) Total CIE: **50 marks** Semester End Examination: **50 marks** [SEE- Theory (35 marks),Lab (15 marks)]	Course end survey

Unit 01: IC FABRICATION — **9 Hours**

IC classification, fundamentals of monolithic IC technology – basic planner process – epitaxial growth, masking and etching, realization of monolithic ICs and packaging. Fabrication of active and passive components (R, C, diodes, transistors, FETs) in ICs.

Unit 02: CHARACTERISTICS OF OP-AMP — **9 Hours**

Block diagram of differential amplifier, packing characteristics, ideal op-amp – ideal differential amplifier – differential mode, common mode, CMRR –ideal op-amp characteristics – practical op-amp characteristics –

open loop and closed loop configuration of ideal and practical op-amp as an inverting amplifier, non-inverting amplifier, voltage follower, DC characteristics, AC characteristics – frequency response, slew rate, frequency compensation.				
UNIT 03: APPLICATIONS OF OP-AMP				**9 Hours**
summing amplifier – adder, subtractor, low pass and high pass filters, three op-amp instrumentation amplifier, log and antilog amplifiers, waveform generator (triangular, saw tooth and stair case waveforms), clippers and clampers, sample and hold circuit, differentiator, integrator, comparators & its characteristics, Schmitt trigger, peak detector, precision rectifiers.				
Unit 04: SPECIAL ICS AND APPLICATIONS				**9 Hours**
555 timer circuit – functional block, applications - monostable multi-vibrator, astable multi-vibrator, 565 phase locked loop – functional blocks, capture range, lock range, applications – frequency multiplier, FSK, AM detection, FM demodulator, 566 voltage controlled oscillator circuit – functional block, voltage to frequency conversion factor, analog multiplier ICs.				
Unit 05: VOLTAGE REGULATORS AND APPLICATION ICS				**9 Hours**
Fixed voltage regulators (IC78xx, 79xx), adjustable voltage regulators (LM317, 337), LM 380 power amplifier, ICL 8038 Function generator IC, general purpose voltage regulator (IC723), switching voltage regulator (ICμA 78S40) – SMPS, isolation amplifier, Opto-coupler, Opto-electronic ICs.				
Theory: 45 Hrs	**Tutorial: --**	**Practical: 30 Hrs**	**Project:--**	**Total Hours: 75 Hrs**
TEXT BOOKS				
1.	D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 6th Edition, 2021.			
2.	Ramakant A.Gayakwad, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, PHI 2021.			
REFERENCES				
1.	Jacob Millman, Christos C. Halkias, "Integrated Electronics – Analog and Digital Circuit System", Tata McGraw Hill, 2009.			
2.	David A. Bell, 'Op-amp & Linear ICs', Oxford, Third Edition, 2011			
3.	S.Salivahanan& V.S. Kanchana Bhaskaran, "Linear Integrated Circuits", TMH, 2014.			
4.	K.R. Botkar, "Integrated Circuits", Khanna Publisher, 5th Edition, 2010.			

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U23EE403	LINEAR INTEGRATED CIRCUITS	L	T	P	J	C
		3	0	2	0	4

LIST OF EXPERIMENTS

1. Design of adder and subtractor using op-amp.
2. Design of Integrator and differentiator (IC741) using op-amp.
3. Design of Low Pass Filter and High Pass Filters using op-amp.
4. Design of instrumentation amplifier using op-amp.
5. Design of Schmitt trigger using op-amp.
6. Design of Precision rectifiers using op-amp.
7. Design of clipper and clamper circuits using op-amp.
8. Design of log and anti-log circuits using op-amp.
9. Design of Astable and Monostable multi vibrators using IC555 timer.
10. Analyze line and load regulation of fixed voltage regulators using IC 7805 and IC 7905.

Total: 30 Hours

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U23EF402	MICROPROCESSOR AND MICROCONTROLLERS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	develop the assembly language programs for the 8086-microprocessor using its instruction set and addressing modes.
CO2:	apply programming and interfacing techniques to configure peripheral controllers with 8086 microprocessors.
CO3:	analyze timer/counter operations and modes of the 8051 micro-controllers.
CO4:	implement 8051 microcontroller interfacing with various external I/O devices
CO5:	develop the control programs using the architecture, timers, and interrupt structure of PIC microcontrollers.

Pre-requisite:

Digital System Design

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	1	2	3	2	1	3	3	3	3	3	3
CO2	2	2	2	1	3	1	1	1	3	1	2	3	2	2
CO3	3	2	2	1	3	1	1	1	3	1	2	3	3	3
CO4	3	3	3	3	3	1	1	1	3	1	2	3	3	3
CO5	3	3	3	3	3	3	3	1	3	3	2	2	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: 8086 MICROPROCESSORS AND INTEL PROCESSORS — **9 Hours**

Architecture of 8086 - Signals - Logical and Physical address- Memory segmentation- Stacks Interrupts and Interrupt Service Routines - Instruction set - Addressing modes - Assembler Directives - Procedures - Macros - Assembly language programming- Introduction on core i3, i5 and i7 processor.

Unit 02: INTERFACING PERIPHERALS OF 8086 AND APPLICATIONS — **9 Hours**

Interfacing and programming 8086 with: Memory Chips-Direct Memory Access-Programmable Peripheral Interface (8255) - Keyboard and Display Controller Interface (8279)-Timer Interface (8254) – DMA controller-Case studies: Traffic Light control, LED display and Alarm Controller.

Unit 03: 8051 MICROCONTROLLER — **9 Hours**

Architecture of 8051 - Special Function Registers (SFRs) - I/O Pins, Ports and Circuits - Instruction Set - Addressing Modes - Assembly Language Programming - Serial Port Programming – Timers-Programming 8051 Timers.

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Unit 04: INTERFACING 8051 WITH I/O PERIPHERALS	9 Hours
Interfacing 8051 with: LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface - Stepper motor and Driver -Case studies: Room temperature monitoring - Street light controller – Waveform generation.	
Unit 05: INTRODUCTION TO RISC BASED ARCHITECTURE	**9 Hours**
PIC16 /18 architecture, Memory organization – Addressing modes – Instruction set - Programming techniques – Timers – I/O ports – Interrupt programming.	

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

TEXT BOOKS

1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2015.
2. Jonathan W. Valvano, Embedded System: Introduction to ARM Cortex-M Microcontrollers, 5th Edition, 2017, ISBN-13: 978-1477508992.

REFERENCES

1. Muhammad Ali Mazidi & Janice Gilli Mazidi, 'The PIC Micro Controller and Embedded Systems', 2010
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U23EF403	CONTROL SYSTEMS	L	T	P	J	C
		2	1	0	0	3

Course Outcomes

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

CO1	develop mathematical model of electrical, mechanical systems and derive the transfer functions.
CO2	perform time-domain analysis of the system to predict the system's behaviour.
CO3	determine the stability of LTI systems using Routh criterion and root locus technique.
CO4	analyse the frequency response and stability of LTI systems.
CO5	obtain state model from transfer function and solve the state equations.

Pre-requisite:

Circuit Theory, Laplace Transform

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	2	1	2	-	-	-	-	-	1	1	3	1
CO2	3	3	2	3	3	-	-	-	-	-	1	2	3	2
CO3	3	3	3	3	3	-	-	-	-	-	1	2	3	2
CO4	3	3	3	3	3	-	-	-	-	-	1	2	3	2
CO5	3	3	3	3	3	-	-	-	-	-	1	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: SYSTEMS AND REPRESENTATION	**9 Hours**

Introduction – classification of control systems – open loop and closed loop systems – transfer functions – Electrical and mechanical (translational and rotational) systems – electrical analogous of mechanical systems – block diagram reduction – Mason's gain formula – Electromechanical Systems.

Unit 02: TIME DOMAIN ANALYSIS	**9 Hours**

Standard test signals – time response of first order systems – step response of second order systems – time domain specifications – steady state error – static and dynamic error coefficients – Introduction to controllers: P, PD, PI and PID.

Unit 03: STABILITY ANALYSIS AND COMPENSATORS	**9 Hours**

Concept of stability – conditions for stability – Routh stability criterion – root locus – effect of addition of poles and zeros – relative stability. Compensation – physical realization of basic compensators (lead, lag and lead-lag).

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Unit 04: FREQUENCY DOMAIN ANALYSIS AND STABILITY	9 Hours
Frequency response – frequency domain specifications – correlation between time and frequency response – Bode plot – determination of transfer function from log-magnitude plot – polar plot – Nyquist stability criterion.	

Unit 05: STATE SPACE ANALYSIS OF LINEAR CONTINUOUS-TIME SYSTEM	9 Hours
Basic concepts – state model – state space representation using physical variables and phase variables – transfer function from state model – solution of state equations – state transition matrix – controllability and observability – Kalman and Gilbert tests.	

Theory: 30 Hrs	Tutorial: 15 Hrs	Practical: --	Project:--	Total Hours: 45 Hrs

TEXT BOOKS

1. I.J.Nagrath and M.Gopal, "Control Systems Engineering", VI Edition, New Age International Ltd, Publishers, 2018.
2. F.Golnaraghi, B.C.Kuo, "Automatic Control Systems", X edition, McGraw Hill education, 2018.

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1. Katsuhiko Ogata, "Modern Control Engineering", V edition, Pearson education, 2015.
2. R.C. Dorf and R.H. Bishop, "Modern Control Systems", XII edition, Pearson education, 2017.
3. J.Distefano, A.Stubberu, et al. "Schaum's Outline: Control Systems", McGraw Hill, 2017.
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U23EF404	DATABASE MANAGEMENT SYSTEMS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

At the end of the course, the students 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 model 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 protocols and transaction recovery mechanisms to ensure consistency, isolation, and efficiency, optimizing system in distributed or complex database environments

Pre-requisite: C-Programming, JAVA, Python

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	-	-	-	1	1	1	1	3	3	3
CO2	3	3	3	3	1	-	-	1	1	1	1	3	3	3
CO3	3	3	3	2	1	-	1	1	1	1	1	3	3	2
CO4	3	3	3	2	1	-	1	1	1	1	1	3	3	2
CO5	3	3	3	3	1	1	1	1	1	1	1	3	3	3

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 — **9 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 mode.

Unit 02: RELATIONAL MODEL — **9 Hours**

Relational data model- relational constraints: Relational model concepts- Relational constraints and Relational data base schema-update operations- basic Relational algebra operations-additional relational

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operations.

SQL: Data definition and Data type-specifying SQL constraints-Basic queries-insert-delete-update-complex queries-views-assertions and triggers-dynamic SQL.

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

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

UNIT 04: DATA STORAGE AND QUERY PROCESSING	**9 Hours**

Disk storage, Basic File Structures, and Hashing: Secondary Storage Device-RAID-Operations on Files-Sorted Files-Hashing Techniques.

UNIT 05: TRANSACTION MANAGEMENT	**9 Hours**

Transaction processing: introduction-Transaction and system Concepts-desirable Properties of Transaction-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.

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

TEXT BOOKS

1. Abraham Silberschatz, Henry F.Korth and Sudarshan.S," Database System Concepts", Seventh Edition, McGrawHill, 2021
2. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems," 7th Edition, Addison-Wesley, 2017.

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1. Dr.Rajiv Chopra,"Database Management System –A Practical Approach"-5th Edition, S Chand Publishing,2016.
2. Raghu Ramakrishnan, "Database Management System". Tata McGraw-Hill Publishing Company, 3rd Edition, 2018
3. Date.C.J.Kannan. A,Swamynathan. S."An Intriduction to Database Systems:, Pearson India, 8th Edition, 2006.
4. Rajesh Narang,"Database Management Systems:, PHI, 2nd Edition, 2011.

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U23EF405	CONTROL AND INSTRUMENTATION LABORATORY	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:	determine the transfer function of DC shunt motors and analyze its response.
CO2:	evaluate response and stability of a linear system.
CO3:	measure electrical parameters using suitable circuit arrangement.

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	-	-	-	3	1	2	3	3	3
CO2	3	3	3	3	3	-	-	-	3	1	2	3	3	3
CO3	3	3	3	3	3	-	-	-	3	1	2	3	3	3

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 **Total: 30 Hours**

Control Systems

1.Determination of characteristics of DC position control system and AC synchros.

2.Determination of transfer functions of armature-controlled and field-controlled DC shunt motor.

3.Design and Analysis of P, PI and PID controllers*.

4.Step response analysis of first and second order systems.

5.Stability analysis of linear time invariant systems (Root locus, Bode, and Nyquist plots).

6.Test of Controllability and Observability in linear continuous time domain state model.

*By using suitable Software.

Instrumentation Systems

1.Measurement of low resistance using kelvin double bridge.

2.Measurement of medium resistance using Wheatstone bridge.

3.Measurement of unknown inductance using Anderson bridge.

4.Measurement of unknown capacitance using Schering bridge.

5.Measurement of earth resistance using Meggar.

6.Measurement of displacement and temperature.

7.Measurement of energy using smart meter.

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U23EF406	MICROPROCESSOR AND MICROCONTROLLERS LABORATORY	L	T	P	J	C
		0	0	2	2	2

Course Outcomes

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

CO1	apply 8086 Assembly programming to perform 16-bit arithmetic and memory interfacing.
CO2	develop 8051 microcontroller to manage I/O (LCD/Keypad), control timing and implement basic serial communication protocols.
CO3	design and implement a real-world system using 8086 microprocessor, 8051 & PIC microcontrollers.

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	2	2	2	2			3	2	2	3	3	3
CO2	3	3	2	2	2	2			3	2	2	3	3	3
CO3	3	3	2	2	2	2			3	2	2	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (10) - Laboratory Quiz 1 (5) CIE test II (10) - Laboratory Quiz 2 (5) CIE III (10) - Project	Record (10) Total CIE: **50 marks** Semester End Examination :**50 marks** SEE : Laboratory	Course end survey

List of Experiments:

1. 16-bit Binary Addition and Subtraction using 8086 Microprocessor.
2. 16-bit Binary Multiplication and Division using 8086 Microprocessor.
3. Interfacing A/D and D/C converters with 8086 Microprocessor.
4. Generation of Square, Saw-tooth, and Triangular Waveforms with 8086 Microprocessor.
5. Interfacing a LCD and Keypad with an 8051 microcontroller.
6. Generation of Time delay using 8051 Microcontroller (focus on Timer programming).
7. Interfacing and Control of DC Motor using 8051 Microcontroller.
8. Interfacing and Programming of Traffic light control using 8051 Microcontroller.
9. Interfacing and Programming of Temperature Indicator using 8051 Microcontroller
10. Simulation and Implementation of Input, Output and Serial Communication using PIC Microcontroller.

Project Description:

As part of the Microprocessors and Microcontrollers Laboratory, students must form a group and undertake a project that applies the concepts learned using 8086, 8051 and PIC architectures. The project shall address a real-life application in solving engineering problems.

- Real-world problems are applicable, such as:

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- •Environmental monitoring (temperature, gas levels, humidity)
- •Smart traffic or parking systems
- •Home or industrial automation
- •Agricultural monitoring and control
- •Safety/security systems
- •Motor control applications
- •Health monitoring applications
- •IoT-based measurement and logging systems

- Students must conduct a brief literature survey to study existing systems and propose one or more solutions for the identified problem.
- Students shall develop either of the simulation model or a prototype development model for evaluation.
- Each group must prepare a brief project report and submit for evaluation.

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

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U23EF407	DATABASE MANAGEMENT SYSTEMS LABORATORY	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:	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: Python, C , JAVA programming languages

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	PO 10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	3	-	-	1	1	1	1	3	3	3
CO2	3	3	3	1	3	-	-	1	1	1	1	3	3	3
CO3	3	2	1	3	3	1	1	1	1	1	-	3	3	3

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

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 report using designing tools
10. Database Design for an application(Mini Project is suggested)

Total: 30 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

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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.

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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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