PSG INSTITUTE OF TECHNOLOGY AND APPLIED RESEARCH

COIMBATORE – 641 062

(Autonomous college affiliated to Anna University)

R2025

Courses of Study, Scheme of Assessment and Syllabi for First, Second, Third and Fourth Semesters

for

B.E. INSTRUMENTATION AND CONTROL ENGINEERING

B.E. INSTRUMENTATION AND CONTROL ENGINEERING
(Minimum No. of credits to be earned: 168)

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER I										
THEORY										
1	25MA101	Calculus and its Applications	3	1	0	4	40	60	100	BS
2	25PH104	Physics for Instrumentation Engineering	3	0	0	3	40	60	100	BS
3	25IC101	Electric Circuits	3	1	0	4	40	60	100	ES
4	25IC102	Electronic Devices and Circuits	3	0	0	3	40	60	100	ES
5	25HS101	English Language Proficiency	3	1	0	4	40	60	100	HS
6	25HS102	தமிழர் மரபு / Heritage of Tamils	1	0	0	1	40	60	100	HS
PRACTICALS										
7	25GE111	Design Thinking for Innovation	0	0	2	1	100	0	100	ES
8	25GE112	Engineering Graphics	0	0	4	2	60	40	100	ES
9	25IC111	Circuits and Devices Laboratory	0	0	4	2	60	40	100	ES
MANDATORY COURSES										
10	25GEM01	Induction Programme**	-	-	-	Grade	-	-	-	MC
Total 29 periods			**16**	**3**	**10**	**24**	**460**	**440**	**900**	

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER II										
THEORY										
1	25MA201	Complex Variables and Transforms	3	1	0	4	40	60	100	BS
2	25CY203	Chemistry for Instrumentation Engineering	3	0	0	3	40	60	100	BS
3	25IC201	Digital Electronics	3	1	0	4	40	60	100	ES
4	25IC202	Linear Integrated Circuits	3	0	0	3	40	60	100	ES
5	25HS201	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	40	60	100	HS
PRACTICALS										
6	25HS21_	Language Elective	0	0	4	2	60	40	100	HS
7	25IC211	Analog and Digital Electronics Laboratory	0	0	4	2	60	40	100	ES
8	25BS212	Physics and Chemistry Laboratory	0	0	4	2	60	40	100	BS
9	25IC212	Problem Solving and Python Programming Laboratory	0	0	2	1	60	40	100	ES
10	25EEC01	Workplace Communication Skills	0	0	2	Grade	100	-	100	EEC
MANDATORY COURSES										
11	25GEM02	Activity Point Programme I*	-	-	-	Grade	-	-	-	MC
Total 31 periods			**13**	**2**	**16**	**22**	**540**	**460**	**1000**	

****As per AICTE norms;**
*** As per AICTE norms; Grade: Non-Credit Course:**

CAT - Category; BS - Basic Science; HS - Humanities and Social Sciences; ES - Engineering Sciences; PC - Professional Core; PE - Professional Elective; OE - Open Elective; EEC - Employability Enhancement Course; MC – Mandatory Course; CA-Continuous Assessment; FE-Final Exam.

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER III										
THEORY										
1	25MA302	Linear Algebra	3	1	0	4	40	60	100	BS
2	25IC301	Sensors and Transducers	4	0	0	4	40	60	100	PC
3	25IC302	C Programming	2	0	0	2	40	60	100	ES
4	25IC303	Electrical Machines	4	0	0	4	40	60	100	BS
5	25HS301	Project and Finance Management	3	0	0	3	40	60	100	HS
PRACTICALS										
6	25IC311	Sensors and Transducers Laboratory	0	0	4	2	60	40	100	PC
7	25IC312	C Programming Laboratory	0	0	2	1	60	40	100	ES
8	25EEC02	Foundations of Problem Solving	0	0	2	1	100	0	100	EEC
MANDATORY COURSES										
9	25MC0__	Mandatory Course I	2	0	0	Grade	100	0	100	MC
10	25GEM03	Activity Point Programme II*	-	-	-	Grade	-	-	-	MC
Total 27 periods			**18**	**1**	**8**	**21**	**520**	**380**	**900**	

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER IV										
THEORY										
1	25MA403	Stochastic Processes and Statistical Analysis	3	1	0	4	40	60	100	BS
2	25IC401	Electrical and Electronic Measurements	3	0	0	3	40	60	100	PC
3	25IC402	Control Systems	3	1	0	4	40	60	100	PC
4	25IC403	Microprocessors and Microcontrollers	4	0	0	4	40	60	100	PC
5	25IC404	Data Structures and Algorithms	2	2	0	4	40	60	100	ES
PRACTICALS										
6	25IC411	Microprocessors and Microcontrollers Laboratory	0	0	4	2	60	40	100	PC
7	25IC412	Measurement and Control Laboratory	0	0	4	2	60	40	100	PC
8	25EEC03	Problem Solving	0	0	2	1	100	0	100	EEC
9	25ICE01	Mini Project I	0	0	2	1	100	0	100	EEC
MANDATORY COURSES										
10	25MC0__	Mandatory Course II	2	0	0	Grade	100	0	100	MC
11	25GEM04	Activity Point Programme III*	-	-	-	Grade	-	-	-	MC
Total 33 periods			**17**	**4**	**12**	**25**	**620**	**380**	**1000**	

*** As per AICTE norms; Grade: Non-Credit Course**

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S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER V										
THEORY										
1	25IC501	Industrial Instrumentation	3	0	0	3	40	60	100	PC
2	25IC502	Digital Signal Processing	3	0	0	3	40	60	100	PC
3	25IC503	Digital Control Systems	3	1	0	4	40	60	100	PC
4	25IC504	Embedded System Design	3	0	0	3	40	60	100	PC
5	25ICP__	Professional Elective I	3	0	0	3	40	60	100	PE
PRACTICALS										
6	25IC511	Signal Processing and Digital Control Laboratory	0	0	2	1	60	40	100	PC
7	25IC512	Embedded Systems Laboratory	0	0	2	1	60	40	100	PC
8	25IC513	Industrial Instrumentation Laboratory	0	0	4	2	60	40	100	PC
9	25EEC04	Aptitude skills	0	0	2	1	100	0	100	EEC
10	25ICE02/ 25ICE03	Internship I / Community Project	0	0	0	1	100	0	100	EEC
MANDATORY COURSES										
11	25GEM05	Activity Point Programme IV*	-	-	-	Grade	-	-	-	MC
Total 26 periods			**15**	**1**	**10**	**22**	**580**	**420**	**1000**	

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER VI										
THEORY										
1	25IC601	Instrumentation System Design	3	0	0	3	40	60	100	PC
2	25IC602	Industrial Process Control	3	1	0	4	40	60	100	PC
3	25IC603	Artificial Intelligence for Measurement and Control	3	0	0	3	40	60	100	PC
4	25ICP__	Professional Elective II	3	0	0	3	40	60	100	PE
5	25__O__	Open Elective I	3	0	0	3	40	60	100	OE
PRACTICALS										
6	25IC611	Instrumentation System Design Laboratory	0	0	4	2	60	40	100	PC
7	25IC612	Process Control Laboratory	0	0	4	2	60	40	100	PC
8	25IC613	Virtual Instrumentation Laboratory	0	0	2	1	60	40	100	PC
9	25EEC05	Enhancing Problem Solving Ability with Code	0	0	2	1	100	0	100	EEC
10	25ICE04	Mini Project II	0	0	2	1	100	0	100	EEC
MANDATORY COURSES										
11	25GEM06	Activity Point Programme V*	-	-	-	Grade	-	-	-	MC
Total 30 periods			**15**	**1**	**14**	**23**	**580**	**420**	**1000**	

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S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER VII										
THEORY										
1	25IC701	Logic and Distributed Control Systems	3	0	0	3	40	60	100	PC
2	25IC702	Industrial Internet of Things	3	0	0	3	40	60	100	PC
3	25ICP__	Professional Elective III	3	0	0	3	40	60	100	PE
4	25ICP__	Professional Elective IV	3	0	0	3	40	60	100	PE
5	25__O__	Open Elective II	3	0	0	3	40	60	100	OE
PRACTICALS										
6	25IC711	Industrial Automation Laboratory	0	0	4	2	60	40	100	PC
7	25IC712	Industrial Internet of Things Laboratory	0	0	2	1	60	40	100	PC
8	25ICE05	Project Work I	0	0	4	2	100	0	100	EEC
9	25ICE06	Internship II	0	0	0	1	100	0	100	EEC
Total 25 periods			**15**	**0**	**10**	**21**	**520**	**380**	**900**	

S. No.	Course Code	Course Title	Hours / Week			Credits	Maximum Marks			CAT
			Lecture	Tutorial	Practical		CA	ESE	Total	
SEMESTER VIII										
THEORY										
1	25ICP__	Professional Elective V	3	0	0	3	40	60	100	PE
2	25ICP__	Professional Elective VI	3	0	0	3	40	60	100	PE
PRACTICALS										
3	25ICE07	Project Work II	0	0	8	4	60	40	100	EEC
Total 14 periods			**6**	**0**	**8**	**10**	**140**	**160**	**300**	

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Summary of Credit Distribution

BE INSTRUMENTATION AND CONTROL ENGINEERING										
S. No.	Course Category	Credits Per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HS	5	3	3	0	0	0	0	0	11
2	BS	7	9	8	4	0	0	0	0	28
3	ES	12	10	3	4	0	0	0	0	29
4	PC	0	0	6	15	17	15	9	0	62
5	PE	0	0	0	0	3	3	6	6	18
6	OE	0	0	0	0	0	3	3	0	6
7	EEC	0	0	1	2	2	2	3	4	14
8	MC	-	-	-	-	-	-	-	-	-
TOTAL		**24**	**22**	**21**	**25**	**22**	**23**	**21**	**10**	**168**

CAT - Category; BS - Basic Science; HS - Humanities and Social Sciences; ES - Engineering Sciences; PC - Professional Core; PE - Professional Elective; OE - Open Elective; EEC - Employability Enhancement Course; MC – Mandatory Course.

LIST OF PROFESSIONAL ELECTIVE COURSES: VERTICALS

S. No.	Vertical I Industrial Electronics and System Design	Vertical II Applied Instrumentation	Vertical III Advanced Control	Vertical IV Diversified	Vertical V Healthcare Instrumentation
1	25ICP01 Industrial Electric Drives	25ICP09 Instrumentation Standards	25ICP17 Advanced topics in PID control	25EEP07 Digital Image Processing	25ICP28 Biomedical Instrumentation
2	25ICP02 Process Modelling and Simulation	25ICP10 Fiber Optics and Laser Instrumentation	25ICP18 Computer Control of Processes	25ICP23 Micro Electro Mechanical systems	25ICP29 Medical Imaging Equipment
3	25ICP03 System Identification	25ICP11 Nano Science and Instrumentation	25ICP19 Building Automation	25EEP35 VLSI Design Techniques	25ICP30 Diagnostic and Therapeutic Instrumentation
4	25ICP04 P and I Diagrams	25ICP12 Virtual Instrumentation	25ICP20 Hydraulics and Pneumatics	25ICP24 Real Time Embedded Systems	25ICP31 Bio-Signal Analysis
5	25ICP05 Graphical System Design	25ICP13 Safety Instrumented Systems	25ICP21 Fault Tolerant Control	25EEP34 Data Analytics	25ICP32 Biomedical Image processing
6	25ICP06 Soft Computing Techniques	25ICP14 Thermal Power Plant Instrumentation	25ICP22 Robotics and Automation	25ICP25 Industry 4.0	25ICP33 Physiological Control Systems
7	25ICP07 Fault Detection and Diagnosis	25ICP15 Instrumentation in Oil and Gas Industry	25EEP03 IoT and its Application	25ICP26 Machine Learning and Deep Learning	25ICP34 Biomechanics
8	25ICP08 Automotive Instrumentation and Control	25ICP16 Instrumentation for Nuclear Power plant	25EEP36 Cyber Security	25ICP27 Multi Sensor Data Fusion	25ICP35 Rehabilitation Instrumentation

LIST OF PROFESSIONAL ELECTIVE COURSES FOR MINOR DEGREE PROGRAMME

S. No.	Course Code	Course Title
1	25ICM01	Test and Measuring Instruments
2	25ICM02	Transducer Engineering
3	25ICM03	Process Instrumentation
4	25ICM04	Introduction to Process Control
5	25ICM05	Essentials of Control Engineering
6	25ICM06	Fundamentals of Industrial Data Communication
7	25ICM07	Analytical Instrumentation Systems
8	25ICM08	Instrumentation Practices in Industries

25MA101 CALCULUS AND ITS APPLICATIONS
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

3 1 0 4

DIFFERENTIAL CALCULUS: Functions of two variables, limits and continuity, partial derivatives, chain rule, extreme values and saddle points, Lagrange multipliers, Taylor's formula for two variables. **(9+3)**

INTEGRAL CALCULUS: Double and iterated integrals over rectangles, double integrals over general regions, Fubini's theorem, area and volume by double integration, reversing the order of integration, double integrals in polar form. **(9+3)**

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS: Basic concepts, separable differential equations, exact differential equations, integrating factors, linear differential equations, modeling - mixing problems, Newton's law of cooling, decay and growth problems. **(9+3)**

SECOND ORDER LINEAR DIFFERENTIAL EQUATIONS: Homogeneous linear equations of second order, homogeneous linear ODEs with constant coefficients, Euler–Cauchy equations, solution by variation of parameters, free oscillations mass spring systems, electric circuits. **(9+3)**

VECTOR CALCULUS: Gradient and directional derivative of a scalar field, divergence and curl of a vector field. Integration in vector field – line integrals, path independence of line integrals, Green's theorem in the plane, divergence theorem of Gauss and Stokes' theorem. **(9+3)**

Total: L: 45 + T: 15 = 60 periods

TEXT BOOKS:

1. J. Hass, C. Heil, and D. W. Maurice, '*Thomas Calculus*'. Pearson Education, New Delhi, 2018.
2. Erwin Kreyszig, '*Advanced Engineering Mathematics*'. Wiley India, New Delhi, 2018.

REFERENCES:

1. H. Anton, I. Bivens, and S. Davis, '*Calculus*'. John Wiley and Sons, USA, 2016.
2. C. R. Wylie and L.C. Barrett, '*Advanced Engineering Mathematics*'. Tata McGraw-Hill, New Delhi, 2019.
3. D. G. Michael, '*Foundations of Applied Mathematics*'. Dover Publications, New York, 2013.
4. Gilbert Strang, '*Calculus*'. Wellesley Cambridge Press, USA, 2017.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the concepts related to Calculus, Differential Equations and Vector Calculus.	**K2**
CO2	Apply the techniques of Calculus, Differential Equations and Vector Calculus to solve engineering problems.	**K3**
CO3	Analyze the solutions of engineering problems employing Calculus, Differential Equations and Vector Calculus.	**K4**
CO4	Use modern tools to solve engineering problems with the help of Calculus, Differential Equations and Vector Calculus.	-

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3												
CO3		1											
CO4					1								
@	**3**	**1**			**1**								

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25PH104 PHYSICS FOR INSTRUMENTATION ENGINEERING

3 0 0 3

MECHANICS: Motion in a straight line, average motion, instantaneous velocity, acceleration and constant acceleration, motion in two and three dimensions, force and motion. Application of Newton's laws. Free body diagram. Work, energy and power. Conservation of energy, conservative and non-conservative forces, conservation of mechanical energy. Gravity **(9)**

RIGID BODY DYNAMICS AND ROTATIONAL MOTION: systems of particles - centre of mass, momentum. Kinetic energy of a system. Elastic and inelastic collisions. Rotational motion, Rotational vectors: velocity, acceleration, torque, angular moment, moment of inertia. – determination of moment of inertia for rigid bodies, rotational energy and rolling motion. **(9)**

ELECTRIC CHARGE, FORCE &FIELD: Electric charge, Coulomb's law, Electric field intensity, electric dipoles, electric field of a dipole along the axis and equatorial point, Equipotential surfaces. Gauss's law of electrostatics: Application of Gauss's law to line, plane and spherical symmetry. Field at a conductor surface. Applications: Microwave cooking, Liquid Crystals, Shielding and Lightning Safety. **(9)**

ELECTRIC POTENTIAL: Electric potential difference, curved paths and non-uniform fields. Calculating potential difference: potential of a point charge, zero potential, finding potential differences using superposition. Potential difference and Electric field, charged conductors. Electrostatic Energy, Capacitors, Energy in the Electric field. Applications: Corona discharge, pollution control and xerography **(9)**

ELECTROMAGNETISM: Magnetic force and field, Charged particles in magnetic fields, Magnetic force on a current. Biot-Savart's law, magnetic force between conductors. Magnetic dipoles, Gauss's law of magnetism. Ampere's law, electromagnetic induction. Faraday's law, magnetic circuits, self and mutual induction – magnetic field energy density, Maxwell's equations and propagation of electromagnetic waves in isotropic media. **(9)**

Total L: 45 periods

TEXT BOOKS:

1. Richard Wolfson, '*Essential University Physics*'. Pearson, 2020
2. Raymond A Serway and John W. Jewett, '*Physics for Scientists and Engineers with Modern Physics*'. Cengage Publishers, USA, 2019.

REFERENCES:

1. D Halliday, R Resnick and Walker, '*Fundamentals of Physics*'. John Wiley and Sons, 12th edition, 2021
2. R. K. Gaur and S.L. Gupta, 'Engineering Physics'. Dhanpat Rai Publications, 2014
3. Hugh D Young and Roger A Freedman, '*University Physics Addison Wesley*'. 15th edition, 2020

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the principles of mechanics, rotational motion, electric fields, electric potential, and electromagnetism, focusing on their fundamental concepts and applications in engineering systems.	**K2**
CO2	Apply mathematical techniques to calculate parameters such as velocity, acceleration, electric field intensity, electric potential, and magnetic flux in engineering contexts.	**K3**
CO3	Analyse physical systems involving mechanical motion, electric and magnetic forces, and energy storage using principles of mechanics, electrostatics, and electromagnetism.	**K4**
CO4	Prepare a report or presentation on the practical applications of electric and magnetic fields in modern engineering systems, highlighting case studies on electromagnetic devices and power systems.	**K5**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3												
CO3		1											
CO4						1			1		1		
@	**3**	**1**				**1**			**1**		**1**		

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC101 ELECTRIC CIRCUITS

3 1 0 4

BASIC DEFINITIONS AND LAWS: Overview of electrical circuits: currents, voltages, power and energy –Circuit elements: active and passive elements –Independent and dependent sources –Resistive circuits: Ohm's law and Kirchoff's laws - Series resistors and voltage division - Parallel resistors and current division –Series voltage source and parallel current source –Y-Δ transformations. **(9+3)**

DC CIRCUIT ANALYSIS AND CIRCUIT THEOREMS: Node voltage analysis – Mesh current analysis –Circuit theorems: Source transformation –Superposition theorem – Thevenin's theorem –Norton's theorem –Maximum power transfer theorem. **(9+3)**

COMPLETE RESPONSE ANALYSIS: First order circuits – Source-Free RC Circuits – Source-Free RL Circuits – Step Response of RC Circuits – Step Response of RL Circuits –Second order circuits –Finding Initial and Final Values – Source-Free Series RLC Circuits – Source-Free Parallel RLC Circuits – Step Response of Series RLC Circuits - Step Response of Parallel RLC Circuits **(9+3)**

AC CIRCUIT ANALYSIS: Single phase circuits – Single phase voltages and currents –Phasor representation – RMS value – Form factor –Energy storage elements: Capacitors and inductors –Phasor relationship for R, L and C – Impedance and admittance – Analysis of Series RLC, Parallel RLC circuits using analytical and phasor methods – Resonance in parallel and series circuits - Bandwidth and Q- factor **(9+3)**

THREE PHASE CIRCUITS: Three-Phase Voltages and currents –Balanced Y-Y Connection, Y-Δ Connection, Δ-Δ Connection, Δ-Y Connection – Power in Balanced System – Unbalanced Three-Phase Systems –connected source and load - Δ connected source and load – Y to Δcircuit –Power and power factor in three phase. **(9+3)**

Total: L: 45 +T: 15 =60 periods

TEXT BOOKS:

1. Charles K. Alexander and Mathew N. O. Sadiku. '*Fundamentals of Electric Circuits*'. 7th edition, Tata McGraw Hill, 2022.
2. John Bird, '*Electrical Circuit Theory and Technology*'. 7th edition, Routledge, 2022.

REFERENCES:

1. Richard C. Dorf and James A Svoboda, '*Introduction to Electric Circuits*'. 9th edition, John Wiley and Sons Inc, 2017.
2. K. C. A. Smith and R.E. Alley, '*Electrical circuits an Introduction*'. Cambridge University Press, 2017.
3. Allan H. Robbins and Wilhelm C. Miller, '*Circuit Analysis: Theory and Practice*'. 5th edition, Cengage publishers, 2013.
4. A. Sudhakar and Shyammohan S. Palli, '*Circuits and Network Analysis and Synthesis*'. 6th edition, Tata McGraw Hill, 2025.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the fundamental concepts of DC/AC electric circuits and network theorems	**K2**
CO2	Solve DC/AC electric circuits using network reduction techniques, mesh and nodal methods, and evaluate resonance parameters	**K3**
CO3	Analyse and obtain the response of DC/AC electric circuits under transient as well as steady-state conditions	**K4**
CO4	Analyse and compute electrical parameters of DC/AC circuits under various operating conditions, and validate the results using Multisim software	**-**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3												3
CO3		2											2
CO4				1	1			1	1				1
@	**3**	**2**		**1**	**1**			**1**	**1**				**3**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC102 ELECTRONIC DEVICES AND CIRCUITS

3 0 0 3

DIODES: Semiconductor materials – N type and P type semiconductor – PN Junction – The Ideal diode – Diode operation – Voltage and current characteristics – Diode models - Diode testing – Zener diode – Zener diode applications –Types of diodes – Diode applications. **(9)**

BIPOLAR JUNCT ION TRANSISTOR: Construction – operation – parameters – characteristics – configuration – biasing – types of biasing – load line - DC Operating point – Transistor as a switch, as an amplifier. (**9)**

FIELD EFFECT TRANSISTORS: Junction Field Effect Transistor (JFET) Construction – Principle of operation - Parameters –Characteristics – Biasing – application – Metal Oxide Semiconductor Field Effect Semiconductor (MOSFET) – types – Construction – Principle of operation - Parameters –Characteristics – Biasing – application. **(9)**

AMPLIFIERS: Amplifier concepts – Gain and attenuation –DC and AC analysis - Impedance matching –Small signal amplifiers – BJT amplifier configurations – Introduction to differential amplifier - Power amplifiers –Class A, B, AB and Class C Power amplifiers –Push-Pull amplifiers. **(9)**

OSCILLATORS: Concept of feedback **–** Conditions for oscillations –Oscillators with RC feedback circuits - Phase shift oscillator - Wein Bridge oscillator - Oscillators with LC feedback circuits- Colpitts oscillators- UJT relaxation oscillator **(9)**

Total L:45 periods

TEXT BOOKS:

1. Albert P. Malvino, David J. Bates and Patrik E. Hoppe, '*Electronic Principles*'. McGraw Hill, 9th edition, 2021.
2. R. L. Boylestad and Nashelsky, '*Electronic Devices and Circuit Theory*'. Pearson Education India, 11th edition, 2015.

REFERENCES:

1. Thomas L. Floyd, '*Electronic Devices*'. Pearson Education, 10th edition, 2021.
2. D. A. Bell, '*Electronic Devices and Circuits*'. Oxford University Press, 5th edition, 2013.
3. J. Millman, C. Halkias and C. D. Parikh, '*Integrated Electronics*'. Tata McGraw-Hill, 2nd edition, 2017.
4. Donald Neamen, '*Electronic Devices: Analysis and Design*'. McGraw Hill, 3rd Edition, 2006.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the structure, characteristics and operation of PN junction devices (Diodes and FETs).	**K2**
CO2	Compute the performance of various configurations of Diodes and FET based circuits by designing proper biasing schemes in oscillators and amplifiers.	**K3**
CO3	Analyse the behaviour of devices in amplifier and oscillator configurations.	**K4**
CO4	Design electronic circuits using semiconductor devices.	**K5**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3											1	
CO3		3			2							1	2
CO4			3		2							1	2
@	**3**	**3**	**3**		**2**							**1**	**2**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25HS101 ENGLISH LANGUAGE PROFICIENCY
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

3 1 0 4

VOCABULARY: Etymology-Prefixes and suffixes–Synonyms–Antonyms–Guessing meanings from context–Word formation- Single-word substitutes- Different forms of a word–Phrasal verbs–Collocations. **(9+3)**

LISTENING AND SPEAKING: Understanding listening – Listening techniques - Introducing oneself and others – Seeking and sharing information– Description-Conversation skills– Extempore speaking– Speech practice in varied formal contexts. **(9+3)**

GRAMMAR: Wh-questions – Yes/no questions– Parts of speech – Articles– Prepositions–Gerunds–Conjunctions- Degrees of comparison– Tenses– Modal verbs – Adverbs - Direct and indirect questions. **(9+3)**

READING: Reading strategies: Skimming and scanning, predicting– Reading comprehension: techniques –Practice reading. **(9+3)**

WRITING: Discourse markers – Dialogue writing - Completing sentences – Jumbled sentences – Paragraph writing –Writing compare & contrast paragraphs – Letter writing. **(9+3)**

Total: L: 45 + T: 15 = 60 Periods

TEXTBOOKS:

1. K. N. Shoba and Lourdes Joavani Rayen, '*Communicative English*'. Cambridge University press, Cambridge, 2021.
2. Raymond Murphy, '*Intermediate English Grammar*'. Cambridge University Press, New Delhi, 2020.
3. Dr M. Sambaiah, '*Technical English an integrated text book*'. Wiley India Pvt. Ltd., 2025.

REFERENCES:

1. Raymond Murphy, '*English Grammar in Use*'. Cambridge University Press, New Delhi 2020.
2. N. P. Sudharshana and C. Savitha, '*English for Engineers*'. Cambridge University Press, New York, 2018.
3. Helen Naylor with Raymond Murphy, '*Essential English Grammar*'. Cambridge University Press, New Delhi, 2019.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Demonstrate the ability to recognize and use a wide range of vocabulary and key grammatical structures accurately, while developing inferential reading skills to comprehend, interpret, and analyze written texts across diverse contexts.	**K2**
CO2	Organize their ideas logically in essay writing, develop paragraphs with clear topic sentences and adapt their letter-writing skills to various real-world scenarios.	**K3**
CO3	Develop and demonstrate clear and confident speaking skills in formal and informal contexts.	

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1									3		3		
CO2									3		3		
CO3									1		1		
@									**3**		**3**		

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25HS102 *தமிழர் மரபு*
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

1 0 0 1

மொழி மற்றும் இலக்கியம்: *இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச்சார் பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.* **(3)**

மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக்கலை: *நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரி முனையில் திருவள்ளுவர் சிலை – இசைக்கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வியல் கோவில்களின் பங்கு.* **(3)**

நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள்: *தெருக்கூத்து, கரகாட்டம், வில்லுப் பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.* **(3)**

தமிழர்களின் திணைக்கோட்பாடுகள்: *தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்க கால நகரங்களும் துறைமுகங்களும் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.* **(3)**

இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: *இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப் பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப் படிகள் – தமிழ் புத்தகங்களின் அச்சு வரலாறு.* **(3)**

Total L: 15 periods

25HS102 HERITAGE OF TAMILS
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

1 0 0 1

LANGUAGE AND LITERATURE: 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. **(3)**

HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE: 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. **(3)**

FOLK AND MARTIAL ARTS: Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils. **(3)**

THINAI CONCEPT OF TAMILS: 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. **(3)**

CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE: 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. **(3)**

Total L: 15 periods

TEXT – CUM – REFERENCE BOOKS

1. கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்
2. முனைவர் இல.சுந்தரம், கணினித்தமிழ், விகடன் பிரசுரம்
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு
4. பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு
5. Dr. K. K. Pillay, '*Social Life of Tamils*'. A joint publication of TNTB, ESC and RMRL
6. Dr. S. Singaravelu, '*Social Life of the Tamils – The Classical Period*'. International Institute of Tamil Studies.
7. Dr. S. V. Subaramanian and Dr. K. D. Thirunavukkarasu, '*Historical Heritage of the Tamils*'. International Institute of Tamil Studies
8. Dr. M. Valarmathi, '*The Contributions of the Tamils to Indian Culture*'. International Institute of Tamil Studies.
9. '*Keeladi – Sangam City Civilization on the banks of river Vaigai*'. Department of Archaeology, Tamilnadu Text Book and Educational Services Corporation, Tamilnadu
10. Dr. K. K. Pillay, '*Studies in the History of India with Special Reference to Tamilnadu*'.
11. '*Porunai Civilization*'. Department of Archaeology, Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu
12. R. Balakrishnan, '*Journey of Civilization Indus to Vaigai*'. RMRL, Tamilnadu
13. V. Priyadharshini, **'***தமிழர் மரபு (Heritage of Tamils)*'. VK publications, Sivakasi.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Describe the Dravidian language family, outline the features of Tamil classical literature, and explain the development of Tamil art, sculpture, and temple-related traditions in a historical context.	**K2**
CO2	Demonstrate the cultural relevance of Tamil folk and martial arts, apply the concepts of Sangam landscape classification to social contexts, and relate Tamil contributions to India's freedom struggle, cultural legacy, and Siddha medicine.	**K3**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1							3				3		
CO2							3				3		
@							**3**				**3**		

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25GE111 DESIGN THINKING FOR INNOVATION
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 2 1

Foundations of Design Thinking: History & Origins: Roots in Creative Problem Solving: Traces back to mid-20th century practices in architecture, engineering, and psychology. Herbert Simon's 'Sciences of the Artificial' (1969): Introduced design as a way of thinking distinct from scientific inquiry. IDEO and the Rise of Human-Centered Design: Popularized design thinking as a repeatable, user-focused innovation process. Stanford school's Influence: Helped institutionalize design thinking in education and entrepreneurship.

Variations of Design Thinking Phases: IDEO's 3-Phase Model: Inspiration, Ideation, Implementation A flexible, non-linear approach emphasizing creativity and action. Stanford school's 5-Phase Model: Empathize, Define, Ideate, Prototype, Test A structured yet iterative framework centered on user empathy. Double Diamond Model (Design Council UK): Divides the process into Discover, Define, Develop, and Deliver—highlighting divergent and convergent thinking.

Related Concepts & Frameworks: Human-Centered Design (HCD): Focuses on designing solutions that deeply resonate with users' needs and contexts. Systems Thinking: Encourages understanding the broader ecosystem and interdependencies within a problem space. Agile & Lean UX: Integrates design thinking with iterative development and minimal viable experimentation. Service Design: Applies design thinking to orchestrate holistic user experiences across touchpoints. Participatory Design: Involves stakeholders directly in the design process to ensure relevance and inclusivity.

EMPATHIZE: Apply Human-Centric Design Principles: Focus on designing solutions that prioritize user needs, experiences, and values throughout the process. Consult Experts: Engage with subject matter experts to gain foundational knowledge about the problem space. Competitive Analysis: Identify & studying similar products or services to identify gaps and opportunities. Stakeholder Interviews: Engaging with people who influence or are affected by the product or service. Conduct Observations: Observe users in their natural environment to understand behaviors, challenges, and interactions. Engage with Users: Use interviews, conversations, and other methods to connect with users and hear their stories. Immerse Yourself: Step into the users' context to experience their environment and challenges firsthand. Create Empathy Maps: Visualize what users say, think, feel, and do to synthesize insights. Identify User Needs and Pain Points: Extract meaningful patterns and needs from user interactions and observations. Set Aside Assumptions: Approach the research with an open mind, suspending personal biases and preconceptions. Document Insights: Capture quotes, observations, and emotional cues to inform the next stage (Define). **(6)**

DEFINE: Organize Research Findings: Review and structure the data collected during the Empathize stage. Analyze Observations: Identify patterns, themes, and insights from user interactions and behaviors. Craft a Human-Centered Problem Statement: Frame the problem from the user's perspective, focusing on their needs—not business goals. Avoid Business-Centric Framing: Refrain from defining problems based on company objectives alone (e.g., market share). Persona Development: Synthesizing research into user personas to guide design decisions. Use Empathy to Guide Definition: Ensure the problem statement reflects real user challenges and motivations. Develop Point-of-View Statements: Create concise summaries that capture who the user is, what they need, and why. Prepare for Ideation: Formulate 'How Might We' questions to spark creative thinking in the next phase. **(6)**

IDEATE: Review the Problem Statement: Revisit the user-centric problem defined in the previous stage to guide ideation. Explore Multiple Perspectives: Encourage diverse viewpoints to broaden the range of potential solutions. Use Ideation Techniques: Apply methods like Brainstorming, Brain writing, SCAMPER, and Worst Possible Idea to spark creativity. Encourage Free Thinking: Create a judgment-free space to generate as many ideas as possible without filtering. Expand the Problem Space Push boundaries and explore unconventional or extreme ideas to uncover hidden opportunities. Refine and Select Ideas: Use evaluation techniques to identify promising concepts that address user needs effectively. Prepare for Prototyping: Choose ideas that are feasible and impactful to develop into tangible prototypes in the next stage. **(6)**

PROTOTYPE: Build Low-Cost Prototypes: Create simple, scaled-down versions of the product or its features to explore ideas. Experiment with Solutions: Implement different solutions from the Ideate stage into prototypes for testing. Test Internally and Externally: Share prototypes with team members, other departments, or a small group of users. Observe User Interactions: Watch how users engage with the prototypes to uncover usability issues and insights. Evaluate and Iterate: Accept, refine, or discard prototypes based on user feedback and performance. Identify Limitations: Discover constraints and challenges in the proposed solutions through hands-on testing. Gain Deeper User Understanding: Learn how users think, feel, and behave when interacting with the product. **(6)**

TEST: Conduct Rigorous Testing: Evaluate the complete product using the most promising prototypes. Observe Real User Interactions: Study how users behave, think, and feel while using the product. Gather Feedback and Insights: Collect qualitative and quantitative data to assess usability and effectiveness. Identify Remaining Issues: Detect limitations, pain points, and areas for improvement. Refine and Iterate: Use test results to improve the product and revisit earlier stages if needed. Redefine Problems if Necessary: Reframe or adjust problem statements based on new insights. Enhance Understanding of Users: Deepen empathy and knowledge of user needs through real-world testing. **(6)**

Design Thinking & Customer Centricity: A human-centered approach that blends empathy and innovation to create solutions that truly resonate with customer needs. Practical Examples of Customer Challenges: Real-world scenarios where customers face friction, unmet needs, or emotional disconnects in their product or service journey. Use of Design Thinking to Enhance Customer Experience: Applying iterative problem-solving and user insights to craft experiences that are intuitive, delightful, and deeply relevant. Parameters of Product Experience: Key dimensions like usability, accessibility, emotional impact, and consistency that shape how customers perceive and interact with a product. Alignment of Customer Expectations with Product Design: Ensuring that every design decision reflects what customers value, expect, and aspire to achieve through the product.

Total P: 30 periods

TEXT BOOKS:

1. T. Brown, '*Change by Design*'. Harper Business, 2009.
2. J. Liedtka and T. Ogilvie, '*Designing for Growth*'. Columbia Business School Publishing, 2011.

REFERENCES:

1. T. Kelley and D. Kelley, '*Creative Confidence*'. Crown Business, 2013.
2. Stanford d. School resources: https://dschool.stanford.edu/
3. https://apphaus.sap.com/toolkit/methods#design-thinking

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Apply empathy-driven research to understand user needs.	**K3**
CO2	Frame actionable problem statements and generate creative ideas.	**K5**
CO3	Develop and test prototypes to refine innovative solutions to the real-world problems.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3					3	3	3	3		3		
CO2		2				2	2	2	2		2		
CO3			1			1	1	1	1		1		
@	**3**	**2**	**1**			**3**	**3**	**3**	**3**		**3**		

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25GE112 ENGINEERING GRAPHICS
(Common to EEE, ECE, ICE and EE-VLSI)

0 0 4 2

INTRODUCTION TO ENGINEERING GRAPHICS **(4)**

1. Introduction to Engineering Graphics.
2. Lettering practice as per BIS.
3. Principles of Dimensioning.

ORTHOGRAPHIC PROJECTIONS **(40)**

1. Introduction to Orthographic Projections.
2. Drawing multiple views from pictorial views of objects.
3. Projection of points.
4. Projection of straight lines (only First angle projections) inclined to both the principal planes.
5. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.
6. Projection of simple solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.

SECTION OF SOLIDS **(8)**

1. Section of simple solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other and obtaining true shape of section.

ISOMETRIC PROJECTIONS **(8)**

1. Isometric projection of simple solids in simple vertical positions.

Total P: 60 periods

TEXT BOOKS:

1. N. D. Bhatt, '*Engineering Drawing*'. Charotar Publishing House Pvt. Ltd., 55th Edition, 2025.
2. K. C. John, '*Engineering Graphics for Degree*'. Prentice Hall India Publishers, 2009.
3. K. V. Natarajan, '*A Text book of Engineering Graphics*'. Dhanalakshmi Publications, 34th Refined Edition, 2021.

REFERENCES:

1. K. Venugopal and V. Prabhu Raja, '*Engineering Graphics*'. New Age International Publishers, 17th Edition, 2024.
2. '*Bureau of Indian Standards*'. Engineering Drawing Practices for Schools and Colleges SP 46-2003, BIS, New Delhi, 2003.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Apply projection techniques to create basic shapes, solids, and sectioned objects.	**K3**
CO2	Use the standards and specifications for engineering drawing.	

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2	1												
@	**3**												

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC111 CIRCUITS AND DEVICES LABORATORY

0 0 4 2

LIST OF EXPERIMENTS:

1. Verification of Maximum Power Transfer theorem.
2. Sinusoidal steady state analysis of RLC circuit.
3. Resonance in RLC series circuit.
4. Transient analysis of RC circuit.
5. Characteristics of PN Junction Diode and Zener diode.
6. Design of Half wave rectifier and Bridge rectifier.
7. Characteristics of Bipolar Junction Transistor.
8. Design of single stage amplifier using Bipolar Junction Transistor
9. RC phase shift oscillator using BJT
10. Junction Field Effect transistor as a switch

Total P:60 periods

REFERENCES:

1. David A Bell, '*Electronic Devices and Circuits Lab Manual*'. Oxford University Press, 4th edition, 2006.
2. Department of Instrumentation and Control Systems Engineering, *'Laboratory manual'*. PSG Institute of Technology and Applied Research, Neelambur, Coimbatore-641062, 2025.

COURSE OUTCOMES

At the end of the course, students will be able to:		Bloom's Level
CO1	Understand the concepts relating to the circuit elements and their operation in DC and AC Circuits	**K2**
CO2	Design and implement electronic circuits using semiconductor devices.	**K3**
CO3	Analyse the behaviour of electrical and electronic circuits by applying maximum power transfer theorem, examining transient and steady-state responses, and designing rectifier, amplifier, and oscillator circuits.	**K4**
CO4	Evaluate the performance of electrical and electronic circuits by interpreting measurements, comparing theoretical and practical results, and assessing the effectiveness of amplifier and oscillator	**K5**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3							2	2			3	2
CO3		3						2	2			3	3
CO4				3	3			2	2			3	3
@	**3**	**3**	**3**	**3**	**3**			**2**	**2**			**3**	**3**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25GEM01 INDUCTION PROGRAMME
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

All students shall undergo an induction programme at the beginning of the first semester for a duration of three weeks as per the guidelines of All India Council for Technical Education (AICTE). A student completing the induction programme will be awarded a completed grade in the grade sheet, and only the students who complete the induction programme shall be considered as eligible for award of degree subject to satisfying other conditions. A student who does not complete the induction programme in the first semester shall redo the same in the subsequent semester.

SEMESTER II

25MA201 COMPLEX VARIABLES AND TRANSFORMS

(Common to CIVIL, EEE, ECE, ICE, MECH and EE-VLSI**)**

3 1 0 4

COMPLEX DIFFERENTIATION: Derivative, analytic function, Cauchy-Riemann equations, Laplace's equation, linear fractional transformations. **(9+3)**

COMPLEX INTEGRATION: Cauchy's integral theorem, Cauchy's integral formula, derivatives of analytic functions, Laurent series, singularities and zeros, residue integration method (Residue integration of complex integrals only). **(9+3)**

LAPLACE TRANSFORMS: Laplace transform, linearity, first shifting theorem, transforms of derivatives and integrals, unit step function, second shifting theorem, Dirac's delta function, periodic functions, differentiation and integration of transforms, solving ODEs with constant coefficients and initial value problems. **(9+3)**

FOURIER ANALYSIS: Fourier series – arbitrary period, even and odd functions, half range expansions. Fourier transforms, Fourier cosine and sine transforms. **(9+3)**

PARTIAL DIFFERENTIAL EQUATIONS: Basic concepts of PDEs, wave equation, heat equation, steady state two-dimensional heat problems, solution by Fourier series. **(9+3)**

Total L: 45 + T: 15 = 60 periods

TEXT BOOKS:

1. Erwin Kreyszig, '*Advanced Engineering Mathematics*'. Wiley India, New Delhi, 2018.
2. G. Z. Dennis, '*Advanced Engineering Mathematics*'. Jones and Bartlett Pvt Ltd, New Delhi, 2017.

REFERENCES:

1. G. Z. Dennis and D. S. Patrick, '*A first course in Complex Analysis with Applications*'. Jones and Bartlett Pvt Ltd, New Delhi, 2015.
2. C. R. Wylie and L. C. Barret, '*Advanced Engineering Mathematics*'. Tata McGraw-Hill, New Delhi, 2019.
3. Peter V. O Neil, '*Advanced Engineering Mathematics*'. Cengage, New Delhi, 2018.
4. G. D. Dean, '*Advanced Engineering Mathematics with MATLAB*'. CRC Press, USA, 2017.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the concepts related to Complex Variables, Laplace Transforms, Fourier Analysis and Partial Differential Equations.	**K2**
CO2	Apply the techniques of Complex Variables, Laplace Transforms, Fourier Analysis and Partial Differential Equations to solve engineering problems.	**K3**
CO3	Analyze the solutions of engineering problems employing Complex Variables, Laplace Transforms, Fourier Analysis and Partial Differential Equations.	**K4**
CO4	Use modern tools to solve engineering problems with the help of Complex Variables, Laplace Transforms, Fourier Analysis and Partial Differential Equations.	**-**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3												
CO3		1											
CO4					1								
@	**3**	**1**			**1**								

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25CY203 CHEMISTRY FOR INSTRUMENTATION ENGINEERING

3 0 0 3

METALS AND ALLOYS: Binary phase diagrams –Cu/Ni, Pb/Ag alloy – interpretation using phase rule, steel – Fe-C phase diagram, heat treatment. Aluminium and titanium alloys. Corrosion – electrode potentials, chemical and electrochemical corrosion – emf series, galvanic series –passivation. Forms of corrosion – galvanic, differential aeration, atmospheric corrosion, stress corrosion cracking, fretting, corrosion fatigue, tribo-corrosion. Corrosion rate – factors influencing corrosion. **(9)**

CORROSION AND WEAR PROTECTION OF METALS: Electropolishing, electroplating – Cu, Ni and Cr, electroless plating – Cu and Ni, anodizing, phosphating, chromating, organic coatings-paints – constituents and functions, powder coating, electrophoretic painting, superhydrophobic and self-healing coatings. Lubricants-classification, properties, mechanism of lubrication- additives, improvers. **(9)**

POLYMERS: Polymerisation - chain and condensation polymerization, polymer topologies – linear, branched and crosslinked, degree of polymerisation, polydispersity, average molecular weight. States of aggregation – amorphous and crystalline states – influence on properties of polymers – thermal properties – phase transitions – Glass transition and melting – thermal analysis, classification based on thermal behaviour – thermoplastics and thermosetting plastics, mechanical properties – stress strain behaviour. Modification of properties of polymers – additives- processing, protective and functional additives, composites – fillers – particulate and fibres – carbon, glass, aramid. **(9)**

INDUSTRIAL AUTOANALYZERS: Performance requirements of analytical instruments. Instrument calibration methods – calibration curve, standard addition, internal standard methods. Automated chemical analysis – segmented flow system and flow injection analysis. Types of analysers – colorimeters and spectrophotometers, ICP-MS, electrochemical analysers- potentiometers, conductivity meters, amperometry. Analysers for water quality monitoring – pH – ion-selective electrode, TDS, conductivity, turbidity determination, Sensors for air quality monitoring –particulate matter, CO, CO_2, VOC., NOx, SOx content determination. Sensors for smart farming– soil nutrient content, pH, humidity. **(9)**

POWER SOURCES FOR IIoT DEVICES: Power requirements for wireless devices. Batteries - characteristics. Primary batteries – construction and working of zinc- carbon cells, lithium cells – Li-MnO_2, Li-FeS_2, Li-$SOCl_2$.Secondary batteries – lead-acid, lithium-ion batteries. Supercapacitors – EDLC and pseudo capacitors. Flexible solar cells – DSSC and polymer photovoltaics – materials – conducting polymers and fullerenes. **(9)**

Total L: 45 periods

TEXT BOOKS:

1. Shashi Chawla, '*A Text Book of Engineering Chemistry*'. Dhanpat Rai and Co., New Delhi, 6th Edition, 2022.
2. S. S. Dara and S. S. Umare, '*A Textbook of Engineering Chemistry*'. S Chand and Co., 2010.

REFERENCES:

1. Robert W. Messler, Jr, '*The Essence of Materials for Engineers*'. Jones and Barlett India Pvt. Ltd., 2011.
2. Derek Pletcher and Frank C. Walsh, '*Industrial Electrochemistry*'. Chapman and Hall, 1993.
3. J. M. G. Cowie and Valeria Arrighi, '*Polymers: Chemistry and Physics of Modern Materials*'. CRC Press, London, 3rd edition, 2016.
4. R. S. Khandpur, '*Handbook of Analytical Instruments*'. McGraw Hill Education (India) Private Limited, 2015.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Learn the basic concepts of engineering materials and instrumentation	**K2**
CO2	Utilize metals, alloys, polymers, energy storage devices and analytical instruments for engineering applications	**K3**
CO3	Analyse the features of materials, methods and select suitable materials and methods for engineering applications	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3										3		
CO3								1	1				
@	**3**							**1**	**1**		**3**		

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC201 DIGITAL ELECTRONICS

3 1 0 4

NUMBER SYSTEMS AND BOOLEAN FUNCTIONS: Review of Number Systems, number complements, Binary arithmetic, Binary codes: weighted and non-weighted codes, alphanumeric codes, Error detection and correction codes, switching functions, Canonical forms, incompletely specified functions, Simplification of logic functions through Boolean Algebra, K –maps and Quine-McClusky method, Implementation of logic functions using basic logic gates and universal gates. **(9+3)**

COMBINATIONAL LOGIC DESIGN: Design of Arithmetic Circuits-Adders / subtractors, carry look-ahead adder, signed number addition and subtraction, BCD adders, IC adders, Magnitude comparator, Decoders, Encoders, Multiplexers and Demultiplexers. Implementation of combinational logic function using multiplexers and demultiplexers - Introduction to HDL. **(9+3)**

SEQUENTIAL LOGIC DESIGN: General model of sequential circuits – Latch, Flip Flops, Design of synchronous sequential circuits–Up-down / Modulus counters, Shift register: Ring counter, Johnson counter, Timing diagram. Mealy / Moore models – Concept of state, State diagram, State table, Design of sequence detector, State reduction procedures using Partitioning and Implication cart. Introduction to Asynchronous Sequential Circuits. **(9+3)**

PROGRAMMABLE LOGIC DEVICES AND HDL: Semicustom design - Introduction to Programmable Logic Devices – Read Only Memory, Programmable Array Logic, Programmable Logic Array, Field Programmable Logic Array, Field Programmable Logic Sequencer, Architecture of Programmable Logic Devices, Implementation of digital functions using HDL. **(9+3)**

DIGITAL LOGIC FAMILIES: Characteristics of digital ICs – Voltage and current ratings, Noise margin, Propagation delay, Power dissipation, Fan-in, Fan-out. TTL logic family–Totem pole, Open collector and tri state outputs. MOS transistor switches – nMOS Inverter /Logic gates, CMOS Inverter / logic gates, ECL logic families, Comparison of performance of various logic families, Interfacing TTL and CMOS devices. **(9+3)**

Total: L: 45 +T: 15 = 60 periods

TEXT BOOKS:

1. M. Morris Mano and Michael D. Cilette, '*Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog*'. 6th edition, Prentice Hall, 2022.
2. Donald P Leach, Albert Paul Malvino and Gautam Saha, '*Digital Principles and Applications*'. 8th edition, Tata McGraw Hill, 2019

REFERENCES:

1. Thomas L Floyd, '*Digital Fundamentals*'. 11th edition, Prentice Hall, 2021.
2. Donald D Givone. '*Digital Principles and Design*'. Tata McGraw Hill, 2019.
3. A. Anand Kumar, '*Fundamentals of Digital Circuits*'. 4th edition, Prentice Hall of India, Pvt Ltd, New Delhi, 2019.
4. R.J. Tocci and N.S. Widmer, '*Digital Systems: Principles and Applications*'. 10th edition, Pearson Education Pvt. Ltd, 2013.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Learn the number systems, Boolean functions, combinational and sequential logic circuits, digital logic families, and their relevance in digital system design	**K2**
CO2	Apply Boolean algebra, K-maps, and logic gates to simplify combinational and sequential circuits.	**K3**
CO3	Analyse and compare various digital logic families and their interfacing techniques in terms of speed, power, and compatibility.	**K4**
CO4	Develop HDL code and programmable logic devices to simulate behaviour of combinational and sequential circuits	**K6**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3											2	
CO3		3										2	
CO4			3		3			1	1		1	3	
@	**3**	**3**	**3**		**3**			**1**	**1**		**1**	**3**	

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC202 LINEAR INTEGRATED CIRCUITS

3 0 0 3

OPERATIONAL AMPLIFIER CHARACTERISTICS: Functional Block Diagram - Symbol - Characteristics of an ideal operational amplifier - Circuit schematic of 741 op-amp - Open loop gain - CMRR - DC characteristics - Frequency response characteristics - stability - frequency compensation –slew rate. **(9)**

LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS: Inverting and Non-inverting amplifiers - Voltage follower - Summing amplifier - Differential amplifier - Instrumentation amplifier: Design and applications - Integrator and Differentiator - Voltage to Current and Current to Voltage converters - Active filters - low pass, high pass, wide band pass, Band stop and notch filter **(9)**

NON-LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS: Comparator - Regenerative comparator - Zero crossing detector - Window detector - Sample and Hold circuit - Precision diode - Half and Full wave rectifiers - Active peak detector - Clipper and Clamper - Logarithmic and Exponential amplifiers - Square and Triangular wave form generators. **(9)**

VOLTAGE REGULATORS AND SPECIAL FUNCTION ICS: Block diagram of general-purpose voltage regulator - Circuit configurations, Fixed and adjustable three terminal regulators - 555 Timer - Functional block diagram and description - Monostable and Astable Operation, Applications PLL: Functional Block diagram - VCO- Principle of operation-Applications. **(9)**

SIGNAL CONVERTERS: Digital to Analog Converters - Binary weighted and R-2R Ladder types - Analog to digital converters - Continuous, Counter ramp - Successive approximation, Single slope –Dual slope and Parallel types - Performance characteristics. **(9)**

Total L:45 periods

TEXT BOOKS:

1. Roy Choudhury and Shail Jain, '*Linear Integrated Circuits*'. 5th edition, New Age International Limited, 2018.
2. F. R. Coughlin and F.F. Driscoll, '*Operational Amplifiers and Linear Integrated Circuits*'. 6th edition, Pearson Education, Noida, 2016.

REFERENCES:

1. A. R. Gayakwad, '*OP-amps and Linear Integrated Circuits*'. 4th edition, Pearson Education, 2016.
2. Sedra and Smith, '*Microelectronic Circuits*'. 7th edition, Oxford University Press, 2017.
3. David A Bell, '*Operational Amplifiers and Linear ICs*'. 3rd edition, Prentice Hall of India, 2013.
4. Sergio Franco, '*Design with Operational Amplifiers and Analog Integrated Circuits*'. 4th edition, McGraw Hill, 2017

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the DC and AC performance characteristics of Op-amp, and its applications, working of 555 timer, LM565 phase-locked loop, analog multipliers, voltage regulators and A-D / D-A Converters.	**K2**
CO2	Apply the basic circuit laws to obtain circuit parameters and waveform in analog electronic circuits.	**K3**
CO3	Analyse analog electronic circuits that meet desired specifications.	**K4**
CO4	Design analog electronic circuits for the desired specifications, and demonstrate through mini-project.	**K5**
CO5	Conduct investigation on analog electronic circuits using MATLAB/ Multisim/PSpice/Proteus simulation tools.	

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3											3	1
CO3		3										1	1
CO4			1	1	1	1		1		1	1	3	1
CO5					3							3	1
@	**3**	**3**	**1**	**3**	**3**	**1**		**1**		**1**	**1**	**3**	**1**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25HS201 *தமிழரும் தொழில்நுட்பமும்*
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

1 0 0 1

நெசவு மற்றும் பானைத் தொழில்நுட்பம்: *சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.* **(3)**

வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: *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.* **(3)**

உற்பத்தித் தொழில் நுட்பம்: *கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணங்கள் – நாணயங்கள் அச்சடித்தல்- மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத் துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.* **(3)**

வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்: *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.* **(3)**

அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்: *அறிவியல் தமிழின் வளர்ச்சி –* ***கணினித்தமிழ்*** *வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.* **(3)**

Total L: 15 periods

25HS201 TAMILS AND TECHNOLOGY
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

1 0 0 1

WEAVING AND CERAMIC TECHNOLOGY: Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries. **(3)**

DESIGN AND CONSTRUCTION TECHNOLOGY: 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. **(3)**

MANUFACTURING TECHNOLOGY: 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 in Silappathikaram. **(3)**

AGRICULTURE AND IRRIGATION TECHNOLOGY: 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. **(3)**

SCIENTIFIC TAMIL & TAMIL COMPUTING: 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. **(3)**

Total L: 15 periods

TEXT – CUM – REFERENCE BOOKS

1. *கே. கே. பிள்ளை, தமிழக வரலாறு - மக்களும் பண்பாடும், தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம் .*
2. *முனைவர் இல.சுந்தரம், கணினித்தமிழ், விகடன் பிரசுரம்*
3. *கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம், தொல்லியல் துறை வெளியீடு*
4. *பொருநை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு*
5. Dr. K. K. Pillay, '*Social Life of Tamils*'. A joint publication of TNTB, ESC and RMRL
6. Dr. S. Singaravelu, '*Social Life of the Tamils – The Classical Period*'. International Institute of Tamil Studies.
7. Dr. S.V. Subaramanian and Dr. K. D. Thirunavukkarasu, '*Historical Heritage of the Tamils*'. International Institute of Tamil Studies
8. Dr. M. Valarmathi, '*The Contributions of the Tamils to Indian Culture*'. International Institute of Tamil Studies.
9. '*Keeladi – Sangam City Civilization on the banks of river Vaigai*'. Department of Archaeology, Tamilnadu Text Book and Educational Services Corporation, Tamilnadu
10. Dr. K. K. Pillay, '*Studies in the History of India with Special Reference to Tamilnadu*'.
11. '*Porunai Civilization*'. Department of Archaeology, Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu
12. R. Balakrishnan, '*Journey of Civilization Indus to Vaigai*' RMRL, Tamilnadu
13. V Priyadharshini, **'***தமிழரும் தொழில்நுட்பமும் (Tamils and Technology)*'. VK publications, Sivakasi.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Identify the significance of ancient Tamil technologies in weaving, pottery, metallurgy, and architecture, with emphasis on traditional design and construction methods across historical periods.	K2
CO2	Use insights from traditional Tamil knowledge systems in agriculture, irrigation, and marine sciences, and connect the development of Tamil language to its applications in digital platforms and computing.	K3

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2							3				3		
@							**3**				**3**		

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

LANGUAGE ELECTIVE

25HS211 COMMUNICATION SKILLS FOR ENGINEERS
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 4 2

COMMUNICATION CONCEPTS: Process of Communication – Inter and Intrapersonal Communication – Essentials for effectiveness. **(9)**

ORAL COMMUNICATION: Oral presentations with visual aids and Group discussions. **(16)**

FOCUS ON SOFT SKILLS: Etiquette – Work Place etiquette – Telephone etiquette- Body Language – Critical Reasoning and Conflict Management based on Case Studies – Group Communication- Meetings -Interview Techniques. **(14)**

TECHNICAL WRITING: Technical Writing Principles - Style and Mechanics - Technical Definitions – Physical, Functional and Process Descriptions – Technical Report Writing – Preparing Instructions – Interpretation of Technical Data. **(14)**

BUSINESS CORRESPONDENCE: Writing Emails, Preparing Resumes. **(7)**

Total P: 60 periods

TEXT BOOKS:

1. Course materials prepared by the Faculty, Department of English.

REFERENCES:

1. Jeff Butterfield, '*Soft Skills for Everyone*'. Cengage Learning, New Delhi, 2020.
2. Sabina Pillai and Agna Fernandez, '*Soft skills and Employability Skills*'. Cambridge University Press, New Delhi, 2019.
3. Prashant Sharma, '*Soft Skills Personality Development for Life Success*'. BPB Publications, New Delhi, 2021.
4. K. N. Shoba and D. Praveen Sam, '*Technical English*'. Cambridge University Press, New York, 2020.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Produce clear and concise technical reports, compose professional and effective emails and develop well-structured and impactful resumes	**K2**
CO2	Plan, organize, and deliver engaging and informative presentations using appropriate visual aids and participate positively in group discussions	**K3**
CO3	Resolve disagreements constructively, embody professional conduct and a strong work ethic and apply critical thinking to generate effective solutions	

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2							3		3				
CO3							1		1				
@							**3**		**3**				

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25HS212 BASIC GERMAN
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 4 2

Guten Tag! - Learning: To greet, learn numbers till 20, practice telephone numbers & e mail address, learn alphabet, speak about countries & languages; **Vocabulary:** related to the topic; **Grammar:** W – Questions, Verbs & Personal pronouns I.

Freunde, Kollegen und ich - Learning: To speak about hobbies, jobs, learn numbers from 20; **Vocabulary:** related to the topic; **Grammar:** Articles, Verbs & Personal pronouns II, sein & haben verbs, ja/nein Frage, singular/plural.

In der Stadt – Learning: To know places, buildings, question, know transport systems, understand international words; **Vocabulary**: related to the topic; **Grammar:** Definite & indefinite articles, Negotiation, Imperative with Sie.

Guten Appetit! – Learning: To speak about food, shop, converse; **Vocabulary:** related to the topic; **Grammar:** Sentence position, Accusative, Accusative with verbs.

Tag för Tag and Zeit mit Freunden – Learning: To learn time related expressions, speak about family, ask excuse, fix appointments on phone, birthdays, understand & write invitations, converse in the restaurant; **Vocabulary:** related to the topic; **Grammar:** Preposition – am, im, um, von…bis, Possessive articles, Modal verbs.

Total P: 60 periods

TEXT BOOK:

1. Dengler, Stefanie et al., '*Netzwerk A1.1*'. Klett-Langenscheidt Gmbh, München, 2013.

REFERENCES:

1. Dengler, Stefanie et al., '*Netzwerk A1*'. Klett-Langenscheidt Gmbh, München, 2013.
2. Sandra Evans,Angela Pude, '*Franz Specht-Menschen A1*'.–Hueber Verlag ,2012.
3. Hermann Funk, Christina Kuhn, Silke Demme, '*Studio d A1*'. Goyal Publishers & Distributors Pvt. Ltd ,2009.
4. Rosa-Maria Dallapiazza, Eduard von Jan, Til Schönherr, '*Tangram Aktuell 1 (Deutsch als Fremdsprache)*'. Max Hueber Verlag, 2004.

25HS213 BASIC JAPANESE
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 4 2

Orientation Session, Geographic & Socio, economic perspective to Japan, Japanese people and culture and Basic greetings and responses.

Basic script, Method of writing hiragana and katakana, and Combination sounds and simple words.

Topic marker 'wa', Desu / dewa arimasen cupolas, Interrogative particle 'ka', Grammar particles 'mo', 'no', 'Introducing some one: 'Kochira wa ~' and Self introductions: Hajimemashite'

Demonstratives 'Kore', 'Sore', 'Are', Demonstrative 'Kono', 'Sono', 'Ano', Possessive noun particle 'no' and Japanese apartments: Greeting your neighbor.

Place markers 'Koko', 'Soko', 'Asoko', Direction markers 'Kochira', 'Sochira', 'Achira' and Japanese department stores: Asking for and buying something.

Asking for and telling the time, Particle 'ni (at)' for time, kara (from) ~ made (until), Particle 'to (and)', Time periods: Days of the week, months, time of day, Verbs (Present / future and past tense) and Telephone enquiry: Asking for a phone no. And business hours.
Destination particle 'e', Particles 'de (mode of transportation)' and 'to (with) and Japanese train station: Asking for Fare and track no. / types of trains.

Direct object particle 'o', Particle 'de (place of action)', Verbs ('~masen ka', '~mashou') and 'Ohanami' Cherry blossom viewing.

Particle 'de (by means of)', Particle 'ni (to)', Aaemasu (give) and Moraimasu (receive) and Visiting a Japanese house.

Adjectives ('i' and 'na' type), Adjectives (Positive and negative usage), Particle 'ga (however, but), 'Dore which?)' and Leaving a room, thanking someone for hospitality.

Likes and dislikes, Potential verbs (wakarimasu and dekimasu), 'Kara (~ because)', Adverbs and Asking someone out over the phone.
Verbs denoting presence: 'Imasu' and 'arimasu', Particle 'ni (in)', 'Dare (who?)', Adverbs ('Chikaku ni ~ '), Particle 'dare mo (negative ~ no one)' , Dare ka (anyone), dare ga (who) , Nani ka (anything) , nani ga (what) - ~ya (and) ~ nado (etc.) and Asking for directions.
Counters and Counting suffixes.
Introduction to Adjectives (na and ii type), Different usages of adjectives, Comparison, Likes and dislikes and Going to a trip.
Need and desire (ga hoshii), Wanting to … (Tabeti desu), Going for a certain purpose (mi –ni ikimasu) and Choosing from a menu.
Verb groups, I, II and III and Exercises to group verbs.
Please do (te kudasai), Present continuous tenses (te imasu), Shall I? (~ mashou ka) and Describing a natural phenomenon (It is raining).
To grant permission (~te mo ii desu), Asking for permission (~ te mo ii desu ka) and Should not do (~ te waikemasen) Describing a continuing state and Describing a habitual action.
Roleplays in Japanese.
A demonstration on usage of chopsticks and Japanese tea party.

Total P: 60 periods

TEXT BOOK

1. '*Minna no nohongo – Romaji ban*'. (first 10 lessons of this book).

REFERENCE

1. '*Minna no Nihongo I Honsatsu Roma*'. – ji ban (Main Textbook Romanized Version). International publisher – 3A Corporation, Tokyo, Indian distributor – Goyal Publishers & Distributors, New Delhi.

25IC211 ANALOG AND DIGITAL ELECTRONICS LABORATORY

0 0 4 2

ANALOG ICS BASED EXPERIMENTS:

1. Implementation of linear applications of operational amplifier
2. Implementation of Nonlinear applications of operational amplifier
3. Design and implementation of active filters
4. Implementation of voltage regulators
5. Realization of a stable multivibrator using 555timer

DIGITAL ICS BASED EXPERIMENTS:

1. Realization of Basic Logic Gates using Universal Gates
2. Design and implementation of combinational circuits
3. Design and implementation of sequential circuits
4. Design and implementation of synchronous sequential circuits
5. Design and Implementation of digital functions using FPGA trainer board.

Total P: 60 periods

REFERENCES:

1. David A Bell, '*Laboratory Manual for Operational Amplifiers and Linear ICs*'. 2nd edition, Prentice Hall of India, New Delhi, 2006.
2. Department of Instrumentation and Control Systems Engineering, *'Laboratory manual'*. PSG Institute of Technology and Applied Research, Neelambur, Coimbatore-641062, 2025.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the various types of combinational and sequential circuits and develop the logical circuit for the given scenario.	**K2**
CO2	Develop the applications of op-amp, voltage regulator circuits and timer IC 555	**K3**
CO3	Analyse the waveform generator circuits using timer IC 555.	**K4**
CO4	Work effectively in teams to perform experiments, analyse the analog and digital circuit, and present findings through well-documented reports and presentations.	**-**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3												
CO3		2						2			2		
CO4			2					2	2	2	2	2	
@	**3**	**2**	**2**					**2**	**2**	**2**	**2**	**2**	

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25BS212 PHYSICS AND CHEMISTRY LABORATORY

0 0 4 2

Physics (Any eight experiments)

1. Determination of specific resistance of a given wire – Carey foster's bridge.
2. Determination of Young's modulus of the material- Uniform Bending
3. Measurement of Hall coefficient of a semiconductor using Hall effect setup.
4. Determination of electrical resistivity of a given material using four probe setup.
5. Determination of wavelength of laser using diffraction grating - LASER.
6. Determination of Thickness of a thin wire – Air wedge method.
7. Study of I-V characteristics of solar cell and determination of its efficiency
8. Determination of velocity of sound and compressibility of liquid - Ultrasonic Interferometer.
9. Determination of Planck's constant and work function of a metal -Photoelectric Effect
10. Determination of bandgap of a semiconductor – Post office box.
11. Validation of Faraday's law of Induction.
12. Interpreting the working mechanism of spirometer,Co2 sensor, Venturi tube and heart rate sensor

Demonstration:

1. Determination of Numerical Aperture and Acceptance angle - Optical Fiber
2. Study the energy loss of a ferrite magnetic material specimen by B-H curve.

Total P: 30 periods

REFERENCES:

1. Department of Physics, *'Physics laboratory observation'*. PSG Institute of Technology and Applied Research, Neelambur, Coimbatore-641062, 2025.
2. Jerry D Wilson; Cecilia A Hernandez Hall, '*Physics laboratory experiments*'. Boston, MA: Cengage Learning, 2016.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Relate the scientific principles and compare the experimental results with theoretical calculations and apply graphical analysis to visualise the importance of precise measurements.	**K3**
CO2	Analyse the experimental result outcomes using analytical and experimental skills for various engineering materials and applications.	**K4**

CHEMISTRY (Any eight experiments)

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of strength of acids in a mixture of acids using conductivity meter.
3. Determination of strength of given hydrochloric acid using pH meter.
4. Estimation of iron content of the given solution using potentiometer.
5. Corrosion experiment-weight loss method.
6. Electroplating of copper and Nickel and determination of coulombic efficiency.
7. Designing a battery and determination of its characteristics.
8. Construction of phase diagram of a simple eutectic system.
9. Determination of kinematic viscosity and acid value of a lubricating oil.
10. Anodizing of aluminium and determination of thickness of anodised film.

Total P:30 periods

REFERENCES:

1. J Mendham '*Vogel's Textbook of Quantitative Chemical Analysis*'. 6th Ed., Pearsons Education 2009.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO3	Demonstrate the measurement of water quality parameters in the given water sample	**K3**
CO4	Analyze the properties of materials for Engineering applications	**K4**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2													
CO3			3						3		3		
CO4				3				3					
@			**3**	**3**				**3**	**3**		**3**		

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC212 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

0 0 2 1

EXPERIMENTS

1. Identification and solving of simple real life or scientific or technical problems, and developing algorithm and flow charts for the same.
2. Python programming using simple statements and expressions
3. Scientific problems using Conditionals and Iterative loops.
4. Implementing real-time/technical applications using Lists, Tuples.
5. Implementing real-time/technical applications using Sets, Dictionaries.
6. Implementing programs using Functions.
7. Implementing programs using Strings.
8. Implementing programs using written modules and Python Standard Libraries
9. Implementing real-time/technical applications using File handling.
10. Implementing real-time/technical applications using Exception handling.
11. Exploring Pygame tool and developing a game activity using Pygame.

Total P:30 periods

TEXT BOOKS:

1. Allen B. Downey, '*Think Python: How to Think like a Computer Scientist*'. 2nd edition, O'Reilly Publishers, 2016.
2. Karl Beecher, '*Computational Thinking: A Beginner's Guide to Problem Solving and Programming*'. 1st edition, BCS Learning and Development Limited, 2017.

REFERENCES:

1. Paul Deitel and Harvey Deitel, '*Python for Programmers*'. 1st edition, Pearson Education, 2021.
2. John V Guttag, '*Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data*'. 3rd edition, MIT Press, 2021.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Understand the basic constructs of Python Programming	K2
CO2	Apply the different data structures like list, tuple, set or dictionary to solve complex problems.	K3
CO3	Implement real-time applications using the modules and packages	K4

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3				3							2	1
CO3		3			3							2	1
@	**3**	**3**			**3**							**2**	**1**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25EEC01 WORKPLACE COMMUNICATION SKILLS
(Common to CIVIL, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

0 0 2 0

BUILDING COMMUNICATION SKILLS:

1. Introduction to Workplace Communication
2. Profile Building for Internships
3. English in the Workplace (Grammar & Vocabulary)
4. Professional Communication (Speaking & Writing)
5. Workplace Communication Tools
6. Career Exploration
7. Resume Update

Total P: 30 periods

REFERENCES:

1. P. C. Wren and H. Martin, '*High school English Grammar and Composition*'. S Chand Publishing, New Delhi, 2017.
2. Norman Lewis, '*Word Power Made Easy*'. Goyal Publisher, New Delhi, 2011.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Understand the importance of soft skills for employability and fine tune their writing skills – Resume writing	**K3**
CO2	Present with clarity and coherence while speaking in formal contexts.	**K2**

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1							3		3				
CO2							3		3				
@							**3**		**3**				

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

SEMESTER III
25MA302 LINEAR ALGEBRA

3 1 0 4

VECTOR SPACES: General vector spaces - real vector spaces - Euclidean n-space - subspaces – linear independence- coordinates and basis - dimension – change of basis - row space, column space and null space – consistency of linear systems - rank and nullity. **(9+3)**

LINEAR TRANSFORMATIONS: General linear transformation - matrix transformations- geometry of linear operators on R^2- matrices for general linear transformations - similarity. **(9+3)**

INNER PRODUCT SPACES: Inner products - angle and orthogonality in inner product spaces, Gram - Schmidt process: QR decomposition, best approximation: least squares - least squares fitting to data. **(9+3)**

EIGENVALUES AND EIGENVECTORS: Eigenvalues and eigenvectors, diagonalization - orthogonal diagonalization - quadratic forms. **(9+3)**

MATRIX DECOMPOSITION AND OPTIMIZATION: Spectral decomposition - singular value decomposition - reduced singular value decomposition - optimization using quadratic forms. **(9+3)**

Total L: 45 + T: 15 = 60 periods

TEXT BOOKS:

1. Howard Anton, Chris Rorres, Anton Haul '*Elementary Linear Algebra*'. Wiley India, New Delhi, 2019.
2. David C Lay,Judi J McDonald, Steven R. Lay '*Linear Algebra and its Applications*'. Pearson Education, New Delhi, 2021.

REFERENCES:

1. Gareth Williams, '*Linear Algebra with Applications*'. Narosa Publishing House, New Delhi, 2017.
2. Gilbert Strang, '*Linear Algebra and Learning from Data'*. Wellesley-Cambridge Press, USA, 2019.
3. Friedberg, Insel and Spence, *'Linear Algebra'*. Pearson Education, USA, 2015.
4. Steven J Leon, *'Linear Algebra with Applications'*. Pearson Education, USA, 2015

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the concepts related to Vector spaces, Linear transformations, Inner product spaces, Eigenvalues, Eigenvectors and Matrix decomposition.	**K2**
CO2	Apply the techniques of Vector spaces, Linear transformations, Inner product spaces, Eigenvalues, Eigenvectors and Matrix decomposition to solve engineering problems.	**K3**
CO3	Analyse the solutions of engineering problems employing Vector spaces, Linear transformations, Inner product spaces, Eigenvalues, Eigenvectors and Matrix decomposition	**K4**
CO4	Use modern tools to solve engineering problems with the help of Vector spaces, Linear transformations, Inner product spaces, Eigenvalues, Eigenvectors and Matrix decomposition.	

COs-POs & PSOs MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	3												
CO3		1											
CO4					1								
@	**3**	**1**			**1**								

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC301 SENSORS AND TRANSDUCERS

4 0 0 4

SCIENCE OF MEASUREMENT: Units and Standards, General concept and terminology of measurement systems, General input - output configuration, transducer classification, Static and Dynamic characteristics, Calibration techniques (analog and digital) Statistical analysis of measurement data. **(12)**

RESISTANCE TRANSDUCERS: Principles of operation, construction details, characteristics of resistance transducers, resistance potentiometers, metal and semiconductor strain gauges. Signal conditioning circuits. Applications of strain gauge for measurement of load and torque. **(12)**

INDUCTIVE TRANSDUCERS: Induction potentiometer, variable reluctance transducers, LVDT, eddy current transducers, synchros and resolvers, magneto - strictive transducers, electromagnetic sensors - associated signal conditioning circuits for above transducers, Proximity sensor. **(12)**

OTHER SENSORS: Piezo-electric transducer, Piezo resistive sensor, capacitive transducer, Hall effect transducer, tachogenerator, stroboscope, photoelectric transducers, thermocouples, gyroscope, seismic instruments and accelerometers, digital displacement transducers, fibre optic sensor, IC sensor, LIDAR **(12)**

INTELLIGENT SENSORS: Smart sensors, Cogent sensors, Virtual sensors, Self adaptive sensors – Adaptation to linearity, Self-validating sensors, Temperature compensating sensors – Selection of sensors. **(12)**

Total L: 60 periods

TEXT BOOKS:

1. Doebelin E O and Dhanesh N Manik, *'Measurement Systems'*. Tata McGraw-Hill, Seventh Edition, 2020.
2. John P. Bentley, *'Principles of Measurement Systems'*. Pearson Education, Fourth Edition, 2020.

REFERENCES:

1. Murty D. V. S, *'Transducers and Instrumentation'*. Prentice-Hall of India Private Limited, New Delhi, Second Edition, 2016.
2. James W.Dally, William F.Rileyand, Kenneth G. McConnell, *'Instrumentation for Engineering Measurements'*. Second Edition, Wiley Publishers, 2012.
3. Manabendra Bhuyan, *'Intelligent Instrumentation: Principles and Applications'*. CRC Press, 2016.
4. Richards S. Figliola and Donald E Beasley, *'Theory and Design for Mechanical Measurements'*. Seventh Edition, Wiley Publishers, 2019.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Describe the principles of measurements, error analysis, characteristics, and operating principles of different types of transducers and sensors.	**K2**
CO2	Apply resistive, inductive, and capacitive transducers for measurement applications, and evaluate measurement errors using statistical methods to assess transducer characteristics.	**K3**
CO3	Analyze the suitability and appropriate transducers and sensors for measuring physical, chemical, and environmental parameters in industrial and real-world applications.	**K4**
CO4	Perform assignments, modelling, and application of transducers and sensors for practical measurement systems.	**K5**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3												2
CO3		3											2
CO4			2		1			1		1	1	2	2
@	**3**	**3**	**2**		**1**			**1**		**1**	**1**	**2**	**2**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC302 C PROGRAMMING

2 0 0 2

INTRODUCTION: Analysing and Defining the Problem - Algorithm - Flow Chart -Types of programming language. C: The C character set - Identifiers and keywords - Data types – Constants - Variables - Declarations - input and output functions-pre-processor directives. **(3)**

OPERATORS AND EXPRESSIONS: Arithmetic operators - Unary operators - Relational operators - logical operators - Assignment operators - Conditional operators -bitwise operators- comma operator – size of operator - precedence and associativity- Library functions. Control Statements: simple if, if..else, nested if .. else, else..if ladder , switch case - while -do while - for - nested loops - break – continue. **(9)**

ARRAYS: Defining an array - Processing an array - Multi dimensional arrays -strings. **(6)**

FUNCTIONS: Function prototype - Defining a function – function call - Passing arguments to a function –nested function – recursive function- Storage classes - auto - static - extern and register variables. **(4)**

STRUCTURES: Definitions - Processing a structure – Array and structures – Nested structures - Structures and functions. Pointers: Definition - Pointer Arithmetic – types of pointer - const pointer, pointer to a constant, void pointer, null pointer. **(8)**

Total L: 30 periods

TEXT BOOKS:

1. Paul Deitel and Harvey Deitel, *'C How to Program: With an Introduction to C++'.* Eighth edition, Pearson Education, 2018.
2. Ajay Mittal, *'Programming in C - A Practical approach'*. Pearson, New Delhi, 2010

REFERENCES:

1. Gottfried B., *'Programming with C'*. McGraw Hill Education, New Delhi, 2018.
2. Herbert Schildt, *'C: The Complete Reference'*. McGraw Hill, New Delhi, 2017.
3. Kernighan B. W. and Ritchie D. M., *'C Programming Language (ANSI C)'*. Prentice Hall of India, New Delhi, 2013.
4. Reema Thareja, *'Programming in C'*. Oxford University Press, India, Second edition, 2016

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Understand the basic concepts and syntax of C Programming.	**K2**
CO2	Write C programs involving structures, arrays of structures, nested structures, file I/O operations, and dynamic memory management techniques.	**K3**
CO3	Develop programs that process and manipulate data using arrays, functions, and structures.	**K4**
CO4	Simulate the basic concepts of C programming using the open-source software.	**-**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3				3								
CO3		2			2								
CO4			1		1			1		1	1		1
@	**3**	**2**	**1**		**3**			**1**		**1**	**1**		**1**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC303 ELECTRICAL MACHINES

4 0 0 4

DC MACHINES: Principles of energy conversion - Construction and principle of operation of DC generator - EMF equation - Characteristics of DC generators - Principle of operation of DC motor - Torque equation- Characteristics of DC motors -Starting of DC motors - Speed control of DC motors - Losses and efficiency calculations- Braking- Applications of DC machines. **(12)**

TRANSFORMERS: Construction and principle of operation of single-phase transformer- EMF equation- Equivalent circuit - Testing of transformer – Efficiency and voltage regulation - All day efficiency - Operation of auto transformers - Three phase transformer connections - Applications of single phase and three phase transformers.

(12)

SYNCHRONOUS MACHINES: Construction and principle of operation of three phase alternators - EMF equation - Determination of regulation - Theory of operation of synchronous motor - Methods of starting- Operating characteristics: Constant excitation with variable load and constant load with variable excitation –Synchronous condenser–Applications. **(12)**

INDUCTION MOTORS: Construction and principle of operation of three phase induction motor - Classification of induction motor –Equivalent circuit - No load and blocked rotor test - Torque production – Torque slip characteristics - Maximum torque - Starting and speed control - Principle of operation of single-phase induction motor - Types of single-phase induction motors and their applications.

(12)

SPECIAL MACHINES: Stepper motor – Switched reluctance motor - Universal motor - Brushless DC motor - Synchros - Servomotor –Linear induction motor. **(12)**

Total L: 60 periods

TEXT BOOKS:

1. Kothari D P and Nagrath I J, *'Electric Machines'*. Fifth Edition, Tata McGraw Hill, 2017.
2. Bimbhra, *'Electrical Machinery'*. Khanna Publishers, 2021.

REFERENCES:

1. Theodore Wildi *'Electrical Machines, Drives and Power Systems'*. Sixth Edition, Pearson Education, 2013.
2. Murugesh Kumar K, *'DC Machines and Transformers'*. Second Edition, Vikas Publishing House, 2016.
3. Bhattacharya S. K, *'Electrical Machines'*. Fourth Edition, Tata McGraw Hill, 2017.
4. Smarajit Ghosh, *'Control Systems Theory and Applications'*. Second Edition, Pearson Education,2013.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the construction, operating principles, and basic characteristics of DC machines, transformers, synchronous machines, induction motors, and special electrical machines.	**K2**
CO2	Compute the performance parameter of AC and DC machines.	**K3**
CO3	Analyse the performance characteristics and speed control methods of DC motors and induction motors under various loading conditions.	**K4**
CO4	Identify suitable speed control technique and starting methods for AC and DC machines.	**K5**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3												3
CO3		3											3
CO4	2												2
@	**3**	**3**											**3**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25HS301 PROJECT AND FINANCE MANAGEMENT

3 0 0 3

INTRODUCTION TO PROJECT MANAGEMENT: Project: Trends in project management, project management versus general management, agile project management, the three goals of a project, life cycle of projects, project selection methods, project portfolio process, case study – friendly assisted living facility. **(9)**

ROLE OF PROJECT MANAGER AND ORGANISATION: Project manager's roles and responsibilities, selection of a project manager, project management as a profession, fitting projects into the parent organisation, the project team and agile team roles, case study – the company with traditional functional organizational structure setting up teams for the new initiatives. **(9)**

PROJECT ACTIVITIES: The planning process, work-breakdown structure and other aids, risk management, methods of budgeting, cost estimation, scheduling the project with PERT and CPM networks, allocating resources, resource loading and levelling, Goldratt's Critical Chain, application – using Project Libre for project management, case study – success of Chandrayan-3. **(9)**

INTRODUCTION TO FINANCE MANAGEMENT: Overview - finance and related disciplines, scope and objectives of financial management, time value of money, and risk and return and calculations with spreadsheet, analysis using cash flow statement and other statements. **(9)**

PERSONAL FINANCE: Compounding, debt, equity and financial markets and investments- debt and bonds. Equity, mutual funds, hedge funds, real estate, and commodities, Personal financial plan to enhance wealth and job marketability, components of a financial plan, tools for planning – financial statements, applying time value concept of money and tax planning. **(9)**

Total L: 45 periods

TEXTBOOKS:

1. Jack R. Meredith and Scott M. Shafer, *'Project Management in Practice'*. Wiley, 2021
2. Khan M. Y. and Jain P. K., *'Basic Financial Management'*. Tata McGraw Hill, 2012
3. Michael Fisher, *'Saving and Investing'*. Author House, 2005
4. Jeff Madura, *'Personal Finance'*. Pearson, 2020

REFERENCES:

1. National Finance Olympiad, *'Personal Finance Handbook'*. Pockvue Solutions, 2024
2. Glen Arnold, *'Investing'*. Financial Times Guides, 2020
3. Rachel Siegel and Carol Yacht, *'Personal Finance'*. Open Textbook Library, Saylor Foundation, 2009
4. Google, *'Google Project Management: Professional Certificate'*. Google Project Management: Professional Certificate, Coursera.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Understand the fundamentals of project management, roles of project managers, and project life cycle concepts.	**K2**
CO2	Apply project planning tools like WBS, PERT, and CPM to effectively plan and schedule project activities.	**K3**
CO3	Analyse various personal finance instruments and develop a personalized financial plan considering investment, tax, and future wealth building strategies.	**K4**
CO4	Apply principles of financial management and spreadsheet-based tools to evaluate cash flows, time value of money, and risk-return trade-offs.	-

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	2												
CO3		2											
CO4				1									
@	**2**	**2**		**1**									

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC311 SENSORS AND TRANSDUCERS LABORATORY

0 0 4 2

LIST OF EXPERIMENTS:

1. Measurement of weight using Strain gauge and Wheatstone bridge circuit.
2. Measurement of linear displacement using LVDT.
3. Temperature measurement using Thermocouple.
4. Temperature measurement using RTD and Thermistor.
5. Design of cold junction compensation for Thermocouples and lead wire compensation schemes for RTD.
6. Measurement of force and pressure using load cell.
7. Measurement of object distance using proximity sensor.
8. Experimental study of loading effect of potentiometer.
9. Implementation of opto-coupler using photoelectric transducers.
10. Characteristics of capacitive measurement systems.
11. Study of Hall effect sensor and digital transducer.
12. Study of vibration measurement using piezoelectric sensor.

Total P:60 Periods

REFERENCES:

1. John P Bentley, *'Principles of Measurement Systems'*. Third Edition, Pearson Education, 2015
2. Department of Instrumentation and Control Systems Engineering, *'Laboratory Manual'*. PSG Institute of Technology and Applied Research, Neelambur, Coimbatore-641062, 2026

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the working principles and characteristics of various sensors and transducers such as strain gauges, LVDT, and temperature sensors through hands-on experiments	**K2**
CO2	Apply sensor measurement techniques to determine physical parameters like displacement, pressure, and vibration in practical scenarios.	**K3**
CO3	Analyse the performance characteristics and limitations of different sensor systems including capacitive, Hall effect, and piezoelectric sensors.	**K4**
CO4	Design sensor-based measurement setups by interfacing opto-couplers, proximity sensors, and load cells for accurate real-world parameter detection.	**K5**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3				3			3	2			3	2
CO3		3						3	2			3	2
CO4			3		3			3				3	2
@	**3**	**3**	**3**		**3**			**3**	**2**			**3**	**2**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC312 C PROGRAMING LABORATORY

0 0 2 1

1. Working with RAPTOR Tool – Flowchart Interpreter
2. Operators
3. Decision making Statements
4. Loops: while, do…While, for
5. One dimensional array
6. Two-dimensional array
7. Strings
8. Functions
9. Recursive functions
10. Structures, array of structures and union.
11. Pointers and double pointers.
12. File handling.

Note: Separate Problem Sheets will be provided during the course

Total P: 30 Periods

REFERENCES:

1. Paul Deitel and Harvey Deitel, *'C How to Program: With an Introduction to C++'*. Eighth edition, Pearson Education, 2018.
2. Ajay Mittal, *'Programming in C - A Practical approach'*. Pearson, New Delhi, 2010.
3. Gottfried B., *'Programming with C'*. McGraw Hill Education, New Delhi, 2018.
4. Herbert Schildt, *'C: The Complete Reference'*. McGraw Hill, New Delhi, 2017.
5. Kernighan B. W. and Ritchie D. M., *'C Programming Language (ANSI C)'*. Prentice Hall of India, New Delhi, 2013

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Understand the basic concepts of C programming through simple programs.	**K2**
CO2	Write a program that utilizes conditional statements, arrays, functions and structures is used to solve problems.	**K3**
CO3	Create modular programs with function calls, recursive functions, and pointer-based operations to enhance program structure and increase the coding efficiency.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3				3								
CO3		2			2								2
@	**3**	**2**			**3**								**2**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25EEC02 FOUNDATIONS OF PROBLEM SOLVING

0 0 2 1

PROBLEM SOLVING:

1.Speed Mathematics (SAW, Oz, Mirror methods)
2. Speed Mathematics (High5, Minion, Butterfly methods)
3. Speed Mathematics (Inception, Golden eye methods)
4. Thinking with Numbers
5. Problem Solving with Visual information
6. Words Puzzles
7. Resume Writing Essentials

Total P: 30 Periods

REFERENCES:

1. R. S. Aggarwal, *'Quantitative Aptitude for Competitive Examination'*. S Chand Publishing, New Delhi, 2017.

SEMESTER IV

25MA403 STOCHASTIC PROCESSES AND STATISTICAL ANALYSIS

3 1 0 4

PROBABILITY AND DISCRETE RANDOM VARIABLES: Probability, axioms, conditional probability, law of total probability, Bayes' theorem, discrete random variables, probability mass function, cumulative distribution function, binomial, Poisson and geometric random variables, expected values. **(9+3)**

CONTINUOUS RANDOM VARIABLES: Cumulative distribution function, probability density function, uniform, exponential and Gaussian random variables, expected values. **(9+3)**

PAIRS OF RANDOM VARIABLES: Joint cumulative distribution function, joint probability mass function, marginal probability mass function, joint probability density function, marginal probability density function, independent random variables, expected values, covariance, correlation and independence, central limit theorem. **(9+3)**

STOCHASTIC PROCESSES: Types of stochastic processes, Poisson process, discrete time Markov chains, classification of states, limiting state probabilities. **(9+3)**

STATISTICAL INFERENCE: Point estimation, interval estimation. Hypothesis testing: one and two tailed tests, tests concerning mean, proportion, and variance, single and two samples, tests for goodness of fit and independence of attributes. **(9+3)**

Total L: 45 + T: 15 = 60 Periods

TEXT BOOKS:

1. Roy D Yates and David J Goodman, *'Probability and Stochastic Processes'*. Wiley India, New Delhi, 2021.
2. Ronald E. W, Raymond H. M, Sharon L. M and Keying Ye, *'Probability and Statistics for Engineers and Scientists'*. Pearson Education, New Delhi, 2016.

REFERENCES:

1. Saeed Ghahramani, *'Fundamentals of Probability with Stochastic Processes'*. CRC Press, USA, 2018.
2. Dougles C Montgomery and George C Runger, *'Applied Statistics and Probability for Engineers'*. Wiley India, New Delhi, 2018.
3. Athanasios P and Unnikrishna P. S, *'Probability, Random Variables and Stochastic Processes'*. Tata McGraw Hill, New Delhi, 2017.
4. Arnold O. A, *'Probability, Statistics and Queueing theory: with computer science applications'*. Academic press, USA, 2014.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the concepts related to Probability, Random variables, Stochastic processes and Statistical inference.	**K2**
CO2	Apply the techniques of Probability, Random variables, Stochastic processes and Statistical inference to solve engineering problems.	**K3**
CO3	Analyse the solutions of engineering problems using Probability, Random variables, Stochastic processes and Statistical inference.	**K4**
CO4	Use modern tools to solve engineering problems with the help of Matrix Theory and Numerical Methods.	

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3												
CO3		1											
CO4					1								
@	**3**	**1**			**1**								

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC401 ELECTRICAL AND ELECTRONIC MEASUREMENTS

3 0 0 3

MEASUREMENT ERROR ANALYSIS: Errors in measurement- types of errors - measurement error combinations- probability of errors: normal distribution of errors- probable error- limiting error- propagation of errors- linear and weighted regression- uncertainty analysis. **(9)**

ANALOG INDICATING INSTRUMENTS: Types of ammeters and voltmeters- PMMC Instruments -Moving Iron Instruments -Dynamometer type Instruments. Measurement of power and energy- Dynamometer type wattmeter - Single phase Induction type energy meter, Calibration of meters, Instrument Transformers: Ratio and phase angle errors, Phasor diagram. **(9)**

MEASUREMENT OF R, L and C: Classification of resistances, Measurement of resistances: Ammeter Voltmeter method, Substitution method, Substitution method, Wheatstone bridge, Kelvin's double bridge method, General equation for AC bridge balance – Maxwell's bridge–Wien's bridge–Hay's bridge–Schering bridge – Anderson bridge. **(9)**

TEST AND MEASURING INSTRUMENTS: Evolution of test and measuring instruments, Digital voltmeter of Ramp and Integrating types, Digital multimeter, Digital Storage Oscilloscope, Mixed Signal Oscilloscope, Wave form analysers– Distortion meter –Power analyser - Spectrum Analyzer, Signal generators. **(9)**

ELECTROMAGNETIC COUPLING: Introduction, Interference coupling mechanism, basics of circuit layout and grounding, concepts of interfaces, filtering and shielding - Safety: Introduction, electrical hazards, hazardous areas and classification - Non-hazardous areas, enclosures – NEMA types, fuses and circuit breakers -Protection methods: purging, explosion proofing and intrinsic safety. **(9)**

Total L: 45 Periods

TEXT BOOKS:

1. Golding E W, Widdis F C, *'Electrical Measurements and Measuring Instruments'*. Third Edition, Reem Publications, New Delhi,2011.

2. David A Bell, *'Electronic Instrumentation and Measurements'*. Oxford Pubilisher,2017.

REFERENCES:

1. Kalsi H S., *'Electronic Instrumentation'*. Third Edition, Tata McGraw-Hill, New Delhi,2017.
2. Sawhney A K, *'A Course in Electrical and Electronic Measurement and Instrumentation'*. Dhanpat Rai and Sons, New Delhi,2017.
3. Albert D, Helfrick, William D Cooper, *'Modern Electronic Instrumentation and Measurement Techniques'*. Pearson Education, NewDelhi,2016.
4. Rangan C S, Sharma G R, Mani V S, *'Instrumentation Devices and Systems'*. McGraw Hill Education, Chennai, 2017.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the types and sources of measurement errors, working principles of analog instruments, and the fundamentals of electromagnetic interference and electrical safety.	**K2**
CO2	Apply suitable instruments and techniques—including analog meters, bridge methods, and digital test equipment—to measure electrical quantities and analyse signals in practical systems.	**K3**
CO3	Analyse the performance and safety aspects of measurement systems considering electromagnetic interference, circuit layout, and protective methods in hazardous and non-hazardous environments.	**K4**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3											3	2
CO3		3			2							3	2
@	**3**	**3**			**2**							**3**	**2**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC402 CONTROL SYSTEMS 3 1 0 4

INTRODUCTION AND MODELING OF CONTROL SYSTEMS: Basic Components of Control Systems – Types of Control Systems – Types of Feedback Control Schemes – Modeling of dynamic systems – Mechanical systems, Electrical systems –Analogies - Linearization of Non-linear systems - Block diagram model – Block diagram and transfer function signal flow graph – Application of Mason's gain formula – Conversion between block diagrams to signal flow graphs. **(9+3)**

ANALYSIS AND DESIGN IN TIME DOMAIN: Introduction - Standard test signals - Time response of prototype first order and second order systems – Specification of step response - Analysis of steady state error: static error constants - Concepts of stability: absolute and relative stability – Routh-Hurwitz criterion. Introduction – Root locus analysis – Design using root locus Plots – Control system design—compensators. **(9+3)**

ANALYSIS AND DESIGN IN FREQUENCY DOMAIN: Introduction—Frequency response analysis – Frequency response specifications – Frequency response plots - Bode plot, Gain margin, Phase margin - Nyquist stability criterion - Stability analysis - Relative stability analysis - Control system design by frequency response analysis– Compensators.

(9+3)

MATHEMATICAL MODELING IN STATE SPACE: State variable representation: State variable concepts, State variable modeling - Modeling of mechanical, Electrical – State diagrams – Transformation of state variables: Similarity Transformation, Invariance property, Conversion of transfer functions to canonical state variable models - Conversion of state variable model to transfer functions. **(9+3)**

ANALYSIS AND DESIGN IN STATE SPACE: Characteristic equation - Eigen values and Eigen vectors - Solution of state equation – State transition matrix - Concepts of controllability and observability - Controllability tests – Observability tests – Controllable and observable companion forms – Duality– Pole placement design – Design of state observers: Full order and reduced order observers. **(9+3)**

Total L: 45 + T: 15 = 60 Periods

TEXT BOOKS:

1. M. Gopal, *'Control Systems: Principles and Design'*. Fourth Edition, Tata McGraw Hill, New Delhi, 2012
2. K Ogata, *'Modern Control Engineering'*. Pearson, Fifth Edition,2018

REFERENCES:

1. William J Palm III, *'System Dynamics'*. Second Edition, Tata McGraw Hill, 2012.
2. Norman S Nise, *'Control Systems Engineering'*. Sixth Edition, John Wiley & Sons, 2011.
3. Farid Galnaraghi & Benjamin C. Kuo, *'Automatic Control System'*. Ninth Edition, John Wiley & Sons, Inc,2010.
4. Anand Natarajan & P Ramesh Babu, *'Control Systems Engineering'*. Second Edition, SciTech, 2010.

COURSE OUTCOMES

At the end of the course, students will be able to:		Bloom's Level
CO1	Classify the components of control systems and modelling methods for dynamic systems	**K2**
CO2	Employ state variable concepts for arriving at canonical models of systems	**K3**
CO3	Examine the performance of the systems both using time and frequency response principles	**K4**
CO4	Evaluate the state equations using eigenvalue and eigenvectors to select the controllability and observability nature of the systems	**K5**
CO5	Design control systems from frequency response characteristics and state observers both in full and reduced forms	**K6**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3											2	2
CO3		2			1							2	2
CO4			1	1		1						2	2
CO5				2								2	2
@	**3**	**2**	**1**	**2**	**1**	**1**						**2**	**2**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC403 MICROPROCESSORS AND MICROCONTROLLERS

4 0 0 4

MICROPROCESSOR: Architecture of 8-bit microprocessor, bus configurations, Instruction set classifications, data format and storage – Overview of 8085 Instruction Set–Programming exercise–Instruction execution time. **(12)**

MEMORY AND I/O INTERFACING: Interface requirements–Address space partitioning Buffering of Buses Memory control signals Typical EPROM, RAM Interfacing. I/O interfacing: Memory mapped I/O scheme–I/O mapped I/O scheme–I/O ports -Programmable peripheral interface. **(12)**

MICROCONTROLLER: Microprocessor versus Microcontroller– 8051 Microcontroller Block diagram – Internal Data RAM – Special Function Registers – Internal register banks and stack–Addressing mode and Instruction Set– 8051 Assembler and Intel Hex file format. **(12)**

ON-CHIP PERIPHERALS AND INTERFACING: Input / Output Ports structure - Counter and Timers, Serial Data Input / Output - Interrupts, LCD, LED and Keyboard Interfacing, ADC, DAC and Sensor interfacing, interfacing to external memory. **(12)**

APPLICATIONS AND PROGRAMMING IN C: Stepper and DC moto interfacing, 8051 programming in C: Data types, I/O programming, Logic operation, Accessing code ROM space. **(12)**

Total L: 60 Periods

TEXT BOOKS:

1. Ramesh S Gaonkar, *'Microprocessor Architecture, Programming and Applications with the 8085'*. Sixth Edition, Penram International,2013.
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D McKinlay, '*8051 Microcontroller and Embedded Systems'*. Second Edition, Pearson Education,2022.

REFERENCES:

1. Kenneth Ayala, *'The 8051 Microcontroller'*. Third Edition, Thomson Delmar Learning, 2016.
2. Krishna Kant, *'Microprocessors and Microcontrollers: Architecture, Programming and System Design 8085, 8086, 8051,8096'*. Second Edition, PHI Learning Pvt.Ltd.,2016
3. Douglas V Hall, *'Microprocessor and Interfacing: Programming and Hardware'*. Third Edition, McGraw Hill Inc, 2013.
4. Subrata Ghosal, *'8051 Microcontroller: Internals, Instructions, Programming and Interfacing'*. Pearson Education India,2010.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the architecture, instruction set, timing, and interfacing techniques of 8-bit microprocessors and microcontrollers, with emphasis on 8085 and 8051, including memory and I/O interfacing, address space partitioning, bus buffering, and programmable I/O devices.	**K2**
CO2	Demonstrate the use of 8051 on-chip peripherals such as timers, serial communication, and interrupts in basic embedded system design.	**K3**
CO3	Construct embedded applications by interfacing 8051 with external hardware components such as LEDs, sensors, motors, ADCs, and DACs using assembly and C programming.	**K4**
CO4	Design and implement a mini-project or case study using 8051 microcontroller and C programming, involving real-world applications such as stepper motor control or sensor-based automation.	**K6**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3												2
CO3		2											2
CO4			1										3
@	**3**	**2**	**1**										**3**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC404 DATA STRUCTURES AND ALGORITHMS

2 2 0 4

ALGORITHM ANALYSIS: Algorithms- properties –-Recursive Algorithms- Analysis of Algorithms-Best case, Average case, Worst case – Asymptotic Notations-Data types – Abstract data types – Types of Data structures **(6+6)**

LINEAR DATA STRUCTURES: Arrays-operations – Memory Representation- Row Major and Column Major – Multi Dimensional Arrays – Sparse Matrix, Dense Matrix. Stack: Array implementation – operations-Applications – Checking of well-formedness of Parenthesis- Infix to Postfix Conversions. **(6+6)**

QUEUES AND LISTS: QUEUES: Queue Operations-Circular Queue - Array Implementation of Queue**,** LINKED LIST: Types-Singly Linked List – Circularly Linked List – Doubly Linked List–List operations-linked stack-linked queue. **(6+6)**

NONLINEAR DATA STRUCTURES: Trees-Terminologies - Binary trees – Representations – Operations – Traversals- In order, Pre-order and Post order- Binary Search Trees – Insertion and deletion. Graph: Terminologies - Breadth First Search algorithm- Depth First Search Algorithm. **(6+6)**

SORTING AND SEARCHING: Bubble Sort – Insertion Sort – Radix Sort- Quick sort- Algorithms and Time Complexity. Linear Search – Binary Search – Hashing: Hash functions – Separate Chaining – Open Addressing – Linear. robing. **(6+6)**

Total L: 30 + T: 30 = 60 Periods

TEXT BOOKS:

1. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, *'Introduction to Algorithms'*. The MIT Press, 2022.
2. Mark Allen Weiss, *'Data Structures and Algorithm Analysis in C++'*. Pearson Education, 2012.

REFERENCES:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, *'Fundamentals of Computer Algorithms'*. Second Universities Press, 2011.
2. Sahni Sartaj, *'Data Structures, Algorithms and Applications in C++'*. Silicon Press, 2009.
3. Aaron M Tanenbaum, Moshe J Augenstein, Yedidyah Langsam, *'Data structures using C and C++'*. PHI Learning, 2009.
4. G A V Vijayalakshmi Pai, *'Data Structures and Algorithms Concepts, Techniques and Allocations'*. New Delhi: McGraw Hill Education (India) Private Limited, 2015.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the concepts of algorithms, their analysis, asymptotic notations, and types of data structures.	**K2**
CO2	Apply appropriate memory representations to implement and manipulate linear data structures such as arrays, stacks, queues, and linked lists (including their variants) to perform efficient insertion, deletion, and traversal operations for various applications.	**K3**
CO3	Analyse the structure and operations of non-linear data structures such as trees and graphs and apply suitable traversal and search algorithms.	**K4**
CO4	Compare different sorting and searching algorithms and evaluate their time complexities to determine their efficiency for given problem scenarios.	**K5**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3				3								
CO3		2			2								
CO4			1		1	1							1
@	**3**	**2**	**1**		**3**	**1**							**1**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC411 MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

0 0 4 2

LIST OF EXPERIMENTS:

1. Arithmetic operations using 8085 microprocessor
2. Code conversion using 8085 microprocessor
3. Sorting using 8085
4. Programmable Peripheral Interfacing i) ADC ii) DAC iii) Traffic Light Controller
5. Rolling display using 8085
6. Arithmetic operations using 8051 microcontroller
7. Logical and Bit manipulation using 8051 microcontroller
8. Generation of delay using on-chip timer/counter
9. ADC and DAC interfacing
10. Stepper and DC motor control interface to 8051.

Total P: 60 Periods

REFERENCES:

1. Mukhopadhyay A. K., *'Microprocessor-Based Laboratory Experiments and Projects'*. Third Edition, I K International Publishing House Pvt. Ltd,2010.
2. Department of Instrumentation and Control Systems Engineering, *'Laboratory Manual'*. PSG Institute of Technology and Applied Research, Neelambur, Coimbatore-641062, 2026.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Use 8085 assembly language instructions to perform arithmetic operations, data conversions, and simple data processing tasks.	**K2**
CO2	Develop programs on 8085 and 8051 to implement algorithms such as sorting, searching, and bitwise manipulations.	**K3**
CO3	Implement peripheral device interfacing through timers, counters, and serial communication features of 8051 for real-time operations.	**K4**
CO4	Build embedded control applications by interfacing 8051 with ADCs, DACs, and motors for real-world automation tasks.	**K5**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1												3	
CO2		3										3	
CO3			2									2	
CO4						1		1	1		1	1	
@			**2**			**1**		**1**	**1**		**1**	**3**	

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25IC412 MEASUREMENT AND CONTROL LABORATORY

0 0 4 2

LIST OF EXPERIMENTS:

1. Measurement of resistance using Wheatstone bridge and Kelvin's Double bridge
2. Measurement of capacitance and inductance using Schering Bridge and Anderson Bridge
3. Extension of instrument ranges
4. Calibration of analog instruments
5. Calibration of digital instruments
6. Time response of first order system
7. Time response of second order system
8. Study of frequency response analysis of a system
9. Empirical modelling of real time systems
10. Design of compensation networks

Total P:60 Periods

REFERENCES:

1. Golding E W, Widdis FC, *'Electrical Measurements and Measuring Instruments'*. Reem Publications, New Delhi, 2011.
2. K Ogata, *'Modern Control Engineering'*. Pearson, Fifth Edition, 2018
3. Department of Instrumentation and Control Systems Engineering, *'Laboratory manual'*. PSG Institute of Technology and Applied Research, Neelambur, Coimbatore-641062, 2026.

COURSE OUTCOMES

At the end of the course, students will be able to:		Bloom's Level
CO1	Interpret the system performance and determine the specifications from the time response of first order and second order systems.	**K2**
CO2	Evaluate the value of resistance as well as capacitance and inductance using measuring bridges.	**K3**
CO3	Calibrate both analog and digital instruments by computing the errors.	**K4**
CO4	Design compensation networks by both time and frequency response analysis	**K5**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1												2	1
CO2	3				2				1			2	2
CO3		3			3				1	1		2	2
CO4			2	3	3				1			2	2
@	**3**	**3**	**3**	**3**	**3**				**1**	**1**		**2**	**2**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

25EEC03 PROBLEM SOLVING

0 0 2 1

1. Algorithmic thinking, branching and repetition problems
2. Logical reasoning - data arrangements and relations
3. Solving problems based on coding and decoding, series, analogy, odd man out and visual reasoning
4. Problems based on ages, logical connectives, syllogisms, data interpretation and data sufficiency
5. Solving problems on clocks calendars, direction sense and cubes
6. Problems based on number system, percentages, simple and compound interest
7. Resume update

Total P: 30 Periods

REFERENCE:

1. R S Aggarwal, *'Quantitative Aptitude for Competitive Examination'*. S Chand Publishing, New Delhi, 2017

25ICE01 MINI PROJECT - I

0 0 2 1

Students should learn project selection methodologies and teamwork skills to design hardware/software products. Create a good technical report and gain motivation to explain project ideas clearly.

Total P: 30 periods

COURSE GUIDELINES:

● Students can choose project based on industry defined problem or user defined problem which must emulate the real-life problems.

● It is desirable that students should work on the project in group of 2 or 3 but not more than three.

● After making the group, students must decide the title of the project and they will present to the department. Also, students will prepare the proposal report of 4-5 pages and submit at the time of presentation.

● At the end, students must submit the final report of the project and the format for the same will be given by the department.

● The plagiarism check for the final report is to be done through the required software suggested by the department and the report must be having similarity less than 25%.

● The students will report to the respective guide/supervisor at every fortnight to discuss their progress.

● The final evaluation of the project will be done based on the demonstration and presentation.

COURSE OUTCOME:

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Identify and define a problem statement relevant to simple engineering problems in electrical and electronics engineering.	**K2**
CO2	Apply basic electronic components and electric circuit concepts to develop a working project.	**K3**
CO3	Analyze and solve the complex problems to proposed project work	**K4**
CO4	Design and develop a basic electrical or electronic system to solve a real-world problem using appropriate tools and techniques.	**K6**
CO5	Demonstrate teamwork, project and finance planning, time management and communicate technical information effectively through reports and presentations.	**-**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	3				3							3	3
CO3		3			3							3	3
CO4			3	3	3	3						3	3
CO5						3	3	3	3	3	3		
@	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

1 – low, 2 – medium, 3 – high @-Overall Contribution to the Course

MANDATORY COURSES

25MC001 ENVIRONMENTAL SCIENCES
(Common to Civil, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

2 0 0 0

INTRODUCTION TO ENVIRONMENT: Environment - Definition, scope and importance. Types and composition of atmosphere – particles, ions and radicals. Ozone layer- significance, formation and depletion. Ecosystems- Structure and functions, components, energy flow, food chains, food web, Biodiversity-levels, values and threats – India as a mega-diversity nation, hotspots of biodiversity, endangered and endemic species of India, conservation of biodiversity. **(6)**

ENERGY RESOURCES: Introduction – National and International status- exploitation - sustainable strategies- Fossil fuels-classification, composition, physico-chemical characteristics and energy content of coal, petroleum and natural gas; solar energy - introduction, harnessing strategies. Wind energy - availability, wind power plants, wind energy conversion systems, site characteristics, and types of wind turbines. Supporting renewable energy resources - tidal, geothermal, hydroelectric. **(6)**

ENVIRONMENTAL POLLUTION: Definition, Sources, causes, impacts and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear hazards, RF hazards, Role of an individual in prevention of pollution. Disaster Management: Floods, earthquake, cyclone and landslides – Case studies, consequences and rescue measures. **(6)**

WASTE MANAGEMENT: Waste water - Characteristics of domestic and industrial wastewater - COD and BOD, Various stages of treatment – primary, secondary, tertiary treatment- Biological and advanced oxidation processes. Solid waste management – Characteristics of municipal solid waste (MSW), biomedical, automobile and e-wastes and their management, landfills, incineration, pyrolysis, gasification and composting**.** **(6)**

SOCIAL ISSUES AND THE ENVIRONMENT: Environmentally Sustainable work practices- Rain water harvesting, Role of non-governmental organizations. Human ethics and rights- impact on environment and human health, role of information technology on environment and human kind. Green IT policies, Process of EIA - ISO 14000. Legislation- Environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act. **(6)**

Total L: 30 periods

TEXT BOOKS:

1. Gilbert M. Masters, '*Introduction to Environmental Engineering and Science*'. Pearson Education, New Delhi, 2004.
2. Deswal S and Deswal A, '*A Basic Course in Environmental Studies*'. Dhanpat Rai and Co, New Delhi, 2004.

REFERENCES:

1. Benny Joseph, '*Environmental Science and Engineering*'. Tata McGraw - Hill, New Delhi, 2006.
2. Koteswara Rao M V R, '*Energy Resources: Conventional & Non – Conventional*'. BSP Publications, New Delhi, 2006.
3. Botkin and Keller, '*Environmental Science*'. Wiley India Private Limited, New Delhi, 2013.

COURSE OUTCOMES:

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the basic concepts of environment, energy sources and waste management	**K2**
CO2	Use different renewable energy resources and environment protection measures for sustainable development	**K3**
CO3	Conduct a case study and real-time environmental issues and present as a team	

COs-POs & PSOs MAPPING:

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1													
CO2	1												
CO3						2	2	2			2		
@	**1**					**2**	**2**	**2**			**2**		

1-low, 2-medium, 3-high @-OVERALL CONTRIBUTION TO THE COURSE

25MC002 INDIAN CONSTITUTION
(Common to Civil, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

2 0 0 0

INTRODUCTION: Evolution of Indian Constitution; significance of constitution; Composition; Preamble and its Philosophy. **(4)**

RIGHTS, DUTIES AND DIRECTIVE PRINCIPLES: Fundamental Rights- Writs and Duties, Directive Principles of State Policy **(5)**

UNION GOVERNMENT: Union Government, President and Vice President, Houses of the Parliament and their functions; Types of Bills, Stages of passing of Bill into an Act, Veto Power, Constitution Amendment Procedure, Various Amendments made and their significance for India. **(6)**

STATE GOVERNMENT AND FEDERALISM: Composition of State Legislature; Powers, Functions and Position of Governor, Function of Chief Ministers, Council of Ministers; The Indian Federal System, Administrative Relationship between Union and States **(8)**

JUDICIARY: Supreme Court, High Court; District Court and Lower Courts - Functions and Powers – Judges – Qualifications and Powers - Judicial Review. **(7)**

Total L: 30 periods

TEXT BOOKS:

1. Subash C Kashyap, '*Our Political System*'. National Book Trust, 2011.
2. Praveenkumar Mellalli E, '*Constitution of India, Professional Ethics and Human Rights*'. Sage Publications India Pvt. Ltd., 2015.

REFERENCES:

1. Briji Kishore Sharma, '*Introduction to the Constitution of India*'. Prentice Hall of India, 2010.
2. Basu D D, '*Introduction to the Constitution of India*'. Prentice Hall of India, 2016.
3. Jain. M C, '*The Constitution of India*'. Law House, New Delhi, 2001.
4. Shukla V N, '*Constitution of India*'. Eastern Book Company Ltd., New Delhi, 2011.

COURSE OUTCOMES:

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Explain the evolution, significance, and philosophy of the Indian Constitution, including its Preamble, composition, and core principles.	**K2**
CO2	Analyze the structure, powers, and functions of the Union and State Governments, including the roles of the President, Parliament, Governor, and Council of Ministers, as well as the legislative process, types of bills, and constitutional amendments.	**K3**
CO3	Conduct a case study on the Indian Constitution, demonstrating understanding of its evolution, fundamental rights and duties, structure of Union and State governments, federal system, and the role of the judiciary in governance.	

COs-POs & PSOs MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	2												
CO3								2	2		2		
@	**2**							**2**	**2**		**2**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course

25MC003 INDUSTRIAL SAFETY
(Common to Civil, CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

2 0 0 0

SAFETY TERMINOLOGIES: Hazard-Types of Hazard- Risk-Hierarchy of Hazards Control Measures-Lead indicators- lag Indicators-Flammability- Toxicity Time-weighted Average (TWA) - Threshold Limit Value (TLV) - Short Term Exposure Limit (STEL)- Immediately dangerous to life or health (IDLH)- acute and chronic Effects-Routes of Chemical Entry-Personnel Protective Equipment- Health and Safety Policy-Material Safety Data Sheet MSDS. **(6)**

STANDARDS AND REGULATIONS: Indian Factories Act-1948- Health- Safety- Hazardous materials and Welfare- ISO 45001:2018 occupational health and safety (OH&S) - Occupational Safety and Health Audit IS14489:1998- Hazard Identification and Risk Analysis- code of practice IS 15656:2006. **(6)**

SAFETY ACTIVITIES: Toolbox Talk- Role of safety Committee- Responsibilities of Safety Officers and Safety Representatives- Safety Training and Safety Incentives- Mock Drills- On-site Emergency Action Plan- Off-site Emergency Action Plan- Safety poster and Display- Human Error Assessment. **(6)**

WORKPLACE HEALTH AND SAFETY: Noise hazard- Particulate matter- musculoskeletal disorder improper sitting poster and lifting Ergonomics RULE & REBA- Unsafe act & Unsafe Condition- Electrical Hazards- Crane Safety- Toxic gas Release. **(6)**

HAZARD IDENTIFICATION TECHNIQUES: Job Safety Analysis-Preliminary Hazard Analysis-Failure mode and Effects Analysis- Hazard and Operability- Fault Tree Analysis- Event Tree Analysis Qualitative and Quantitative Risk Assessment- Checklist Analysis- Root cause analysis- What-If Analysis- and Hazard Identification and Risk Assessment. **(6)**

Total L: 30 periods

TEXTBOOKS

1. Jain R. K. and Sunil S. Rao, '*Industrial Safety, Health and Environment Management Systems*'. Khanna Publisher, 4th Edition, 2000.
2. Deshmukh L. M., *'Industrial Safety Management: Hazard Identification and Risk Control'.* McGraw-Hill Education, 2007.

REFERENCES

1. John Ridley, John Channing, '*Safety at Work*'. Routledge, 7th Edition, 2008.
2. Dan Petersen, '*Techniques of Safety Management*: *A System Approach*'. Amer Society of Safety Engineers, 4th Edition, 2003.

COURSE OUTCOMES

At the end of the course, students will be able to		**Bloom's Level**
CO1	Describe the safety protocols and standard operating procedures in industrial settings to ensure compliance with safety regulations and minimize hazards in the workplace.	**K2**
CO2	Implement and test emergency response plans tailored to the industrial environments, ensuring effective action during emergencies such as fires, chemical spills or equipment malfunctions.	**K3**
CO3	Review and present on risk assessments and hazards using industry-specific tools to identify potential safety risks and choose appropriate corrective actions to prevent accidents and injuries.	-

CO - PO & PSO MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1													
CO2	2					2	2						
CO3						1	1	1	1		1		1
@	**2**					**2**	**2**	**1**	**1**		**1**		**1**

1 - low, 2- medium, 3 – high @-Overall Contribution to the Course

25MC004 DISASTER RISK REDUCTION AND MANAGEMENT
(Common to CSE, EEE, ECE, ICE, MECH, AI&DS and EE-VLSI)

2 0 0 0

HAZRADS, VULNERABILITY AND DISASTER RISKS: Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Types of Disasters: Natural, Human induced, Climate change induced – Earthquake, Landslide, Flood, Drought, Fire, etc. – Technological disasters - Structural collapse, Industrial accidents, oil spills - Causes, Impacts including social, Economic, political, environmental, health, psychosocial, etc.- Disaster vulnerability profile of India and Tamil Nadu - Global trends in disasters: urban disasters, pandemics, Complex emergencies, Inter relations between Disasters and Sustainable development Goals. **(6)**

DISASTER RISK REDUCTION (DRR): Sendai Framework for Disaster Risk Reduction, Disaster cycle - Community Based DRR, Structural – Non-structural measures, Roles and responsibilities of - community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders - Early Warning System – Relevance of indigenous Knowledge, appropriate technology and Local resources. **(6)**

DISASTER MANAGEMENT: Components of Disaster Management – Preparedness of rescue and relief, mitigation, rehabilitation and reconstruction - Disaster Risk Management and post disaster management – Compensation and Insurance- Disaster Management Act (2005) and Policy - Institutional Processes and Framework at State and Central Level - (NDMA – SDMA – DDMA – NRDF - Civic Volunteers). **(6)**

TOOLS AND TECHNOLOGY FOR DISASTER MANAGEMENT: Early warning systems - Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness) – Role of GIS and Information Technology in Disaster Management – Disaster Damage Assessment - Elements of Climate Resilient Development – Standard operation Procedure for disaster response – Financial planning for disaster Management. **(6)**

DISASTER MANAGEMENT: CASE STUDIES: Case studies in the context of disasters - Landslide Hazard Zonation, Earthquake Vulnerability Assessment of Buildings and Infrastructure, Drought Assessment, Coastal Flooding, Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding, Forest Fire, Man Made disasters. **(6)**

Total L: 30 periods

TEXTBOOKS

1. Thomas D. Schneid, and Larry Collins, '*Disaster Management and Preparedness*'. CRC Publications, 2016.
2. R. Singh, '*Disaster Management Guidelines: Earthquakes, Landslides, Avalanches and Tsunami'*. Horizon Press Publications, 2017.
3. J. P. Singhal, '*Disaster Management'*. Laxmi Publications, 2024.
4. T. Bhattacharya, '*Disaster Science and Management'*. McGraw Hill India Education Pvt. Ltd., 2012.

REFERENCES

1. Government of India, '*Disaster Management Act'*. New Delhi, 2005.
2. Government of India, '*National Disaster Management Policy'*. New Delhi, 2009.
3. R. Shaw, '*Community based Disaster risk reduction*'. Natural Hazard Science, Oxford Research Encyclopedias, 2016.

COURSE OUTCOMES

At the end of the course, students will be able to:		**Bloom's Level**
CO1	Summarize the concepts, tools, technologies and strategies for disaster risk reduction and management.	**K2**

COs-POs & PSOs MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1					1	1	1	1	1		1		
@					**1**	**1**	**1**	**1**	**1**		**1**		

1-low, 2-medium, 3-high @-Overall Contribution to the Course