DEPARTMENT

OF

ELECTRONICS & COMMUNICATION ENGINEERING

SCHEME OF EVALUATION

& SYLLABUS of UG B.E. COURSE

III Semester – July to Dec 2019

(II Year) - Odd Sem (Academic Year : 2019-20)

Autonomous Course

Batch : 2018-22

Dayananda Sagar College of Engineering

Shavige Malleshwara Hills, Kumaraswamy Layout,
Banashankari, Bangalore-560078, Karnataka
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Web - http://www.dayanandasagar.edu Email : hod-ece@dayanandasagar.edu
(An Autonomous Institute Affiliated to VTU, Approved by AICTE & ISO 9001:2008 Certified)
(Accredited by NBA, National Assessment & Accreditation Council (NAAC) with 'A' grade)

About the College & the Department

The Dayananda Sagar College of Engineering was established in 1979, was founded by Sri R. Dayananda Sagar and is run by the Mahatma Gandhi Vidya Peetha Trust (MGVP). The college offers undergraduate, post-graduates and doctoral programmes under Visvesvaraya Technological University & is currently an autonomous institution. MGVP Trust is an educational trust and was promoted by Late. Shri. R. Dayananda Sagar in 1960. The Trust manages 28 educational institutions in the name of "Dayananda Sagar Institutions" (DSI) and multi – Specialty hospitals in the name of Sagar Hospitals - Bangalore, India & is spread across an area of 29 acres. Dayananda Sagar College of Engineering is approved by All India Council for Technical Education (AICTE), Govt. of India and affiliated to Visvesvaraya Technological University. It has widest choice of engineering branches having 16 Under Graduate courses (including architecture) & 13 Post Graduate courses. In addition, it has 20 Research Centres in different branches of Engineering catering to research scholars for obtaining Ph.D. under VTU. Various courses are accredited by NBA & the college has a NAAC with ISO certification. One of the vibrant & oldest dept is the ECE dept. & is the biggest in the DSI group with 70 staffs & 1100+ students with 14 Ph.D.'s & 40^{+} staffs pursuing their research in various universities. At present, the department runs a UG course (BE) with an intake of 240 & 2 PG courses (M.Tech.), viz., VLSI Design Embedded Systems & Digital Electronics & Communications with an intake of 18 students each. The department has got an excellent infrastructure of 10 sophisticated labs & dozen class room, R & D centre, etc…

Vision & Mission of the Institute

Vision:

- To impart quality technical education with a focus on Research and Innovation emphasizing on Development of Sustainable and Inclusive Technology for the benefit of society.

Mission:

- To provide an environment that enhances creativity and Innovation in pursuit of Excellence.
- To nurture teamwork in order to transform individuals as responsible leaders and entrepreneurs.
- To train the students to the changing technical scenario and make them to understand the importance of sustainable and inclusive technologies.

Vision & Mission of the Department

Vision :

- To achieve continuous improvement in quality technical education for global competence with focus on industry, societal needs, research and professional success.

Mission:

- Offering quality education in Electronics and Communication Engineering with effective teaching learning process in multidisciplinary environment.
- Training the students to take-up projects in emerging technologies and work with team spirit.
- To imbibe professional ethics, development of skills and research culture for better placement opportunities.

Program Education Objectives

After four years, the students will be

PEO1 : ready to apply the state-of-art technology in industry and meeting the societal needs with knowledge of Electronics and Communication Engineering due to strong academic culture.

PEO2 : competent in technical and soft skills to be employed with capability of working in multidisciplinary domains.

PEO3 : professionals, capable of pursuing higher studies in technical, research or management programs.

Program Specific Outcomes

PSO1 : Design, develop and integrate electronic circuits and systems using current practices and standards.

PSO2 : Apply knowledge of hardware and software in designing Embedded and Communication systems.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. Engineering Knowledge: Apply the Knowledge of Mathematics, Science, Engineering Fundamentals, and an Engineering specialization to the solution of complex Engineering problems.
2. Problem Analysis: Identify, Formulate, Review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of Mathematics, natural sciences and engineering sciences.
3. Design/Development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental conditions.
4. Conduct investigations on complex problems: Use research based knowledge and research methods including design of Experiments, analysis and interpretation of data, and synthesis of Information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate technique, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess society, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

SCHEME OF EVALUATION

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examination 2018 – 19
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2018 – 19)

III SEMESTER

No	Course and Course Code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	BSC	18MA3GCDIT	Discrete & Integral Transforms	Maths	2	--	2	03	40	60	100	2
2	PCC	18EC3DCAEC	Analog Electronics	ECE	3	2	--	03	40	60	100	3
3	PCC	18EC3DCDEC	Digital Electronics	ECE	3	0	--	03	40	60	100	3
3	PCC	18EC3DCECA	Electrical Circuit Analysis	ECE	3	0	--	03	40	60	100	3
5	PCC	18EC3DCEMF	Electromagnetic field theory	ECE	3	0	--	03	40	60	100	4
6	PCC	18EC3DCENI	Electronic Instrumentation	ECE	3	0	--	03	40	60	100	3
7	PCC	18EC3DLAEL	Analog Electronics Lab	ECE	--	2	2	03	40	60	100	2
8	PCC	18EC3DLDEL	Digital Electronics Lab	ECE	--	2	2	03	40	60	100	2
9	HSMC	18HS3DCKAN	Communication Kannada	HSMC	1	--	--	--	100	--	100	1
		OR	**OR**									
		18HS3DCCIP	Constitution of India & Prof. Ethics & Human Rights		1	--	--	02	40	60		
				TOTAL	**18**	**8**	**4**	**26**	**420 OR 360**	**480 OR 540**	**900**	**23**

CIE procedure for Communication Kannada: A committee constituted by the Head of the Department of Humanities and Social Science shall award the CIE marks for the Course Communication Kannada. The committee shall consist of two senior faculty members of the Department and the senior most acting as the Chairman / Chairperson.

Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs

10	NCMC	18MATDIP31	Additional Mathematics - I	Maths	2	1	--	3	40	60	100	0

(a) The mandatory non – credit courses Additional Mathematics I and II prescribed at III and IV semesters respectively, to lateral entry Diploma holders admitted to III semester of BE/B.Tech. programs, shall compulsorily be registered during the respective semesters to complete all the formalities of the course and appear for the University examination.

(b) The mandatory non – credit courses Additional Mathematics I and II, shall be completed to secure eligibility to VII semester. However, these Courses shall not considered for vertical progression from II year to III year but considered as head of passing along with credit courses of the programme for eligibility to VII semester.

Courses prescribed to lateral entry B. Sc degree holders admitted to III semester of Engineering programs

Lateral entrant students from B.Sc. Stream, shall clear the non-credit audit courses Engineering Graphics / Elements of Civil Engineering and Mechanics of the First Year Engineering Programme. These Courses shall not be considered for vertical progression from II year to III year but considered as head of passing along with credit courses of the programme for eligibility to VII semester.

Note: BSC: Basic Science, PCC: Professional Core, HSMC: Humanity and Social Science, NCMC: Non-credit mandatory course.

DISCRETE & INTEGRAL TRANSFORMS

Course Code : 18MA3GCDIT **Credits : 03**
L : P : T : S : 3 : 1 : 0 : 0 **CIE Marks : 50**
Exam Hours: 03 **SEE Marks : 50**
Total Hours: 40 **CIE + SEE Marks : 100**

Course Objectives:

1. Generalize a periodic function as a sum of series of trigonometric functions using Fourier series
2. Explain the concept of Fourier and Z transform and state the use of it in time varying
   signals (continuous).
3. Introduce Programming lab for Descriptive statistics

Course Outcomes: At the end of the course, student will be able to:

CO1	Use Method of Least Square for finding best fit Curves
CO2	Use software to analyze statistical data to standard typology
CO3	Apply Z - Transform to solve Difference Equations
CO4	Expand a periodic function as trigonometric series (Fourier series).
CO5	Apply Laplace Transform to solve ordinary differential equation
CO6	Demonstrate Fourier Transform as a tool for solving Integral equations.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**1**	**1**								
CO2	**3**	**3**	**2**	**1**								
CO3	**3**	**3**	**1**	**1**								
CO4	**3**	**3**	**2**	**1**								
CO5	**3**	**3**	**2**	**1**								
CO6	**3**	**3**	**2**	**1**								

Module	Contents of the Module	Hours	CO's
1	**Curve Fitting & Statistics :** Curve Fitting**:** Curve fitting by the method of least squares, Fitting a straight line and parabola. Statistics Modeling**:** Analyzing a data - Mean, Standard deviation-combination of two groups, correlation, Linear regression. Application Problems.	8	CO1 CO2
2	**Z-Transforms**: Definition, Standard Z-transforms, Damping rule, Shifting rule, Initial value and final value theorems (without proof), Inverse Z-Transforms, Application of Z-transforms to solve difference equations. Application Problems.	8	CO3
3	**Fourier Series** Periodic functions, Dirichlet's conditions, Fourier series of periodic functions of period 2π and with arbitrary period $2l$, Half-range Fourier sine and cosine series, Practical Harmonic Analysis. Application Problems.	8	CO4
4	**Integral Transforms –I** Laplace Transform: Definition and Laplace Transforms of Elementary functions, Laplace Transforms of $e^{at}f(t), t^n f(t), \frac{f(t)}{t}$, Periodic functions, Unit Impulse function (statements only)-problems. Inverse Laplace Transforms**:** Inverse Laplace Transforms of Logarithmic and Trigonometric functions, Inverse Laplace transform by the method of Partial Fractions. Convolution Theorem(statement only)-problems. Application Problems.	8	CO5
5	**Integral Transforms –II** Fourier Transform: Infinite Fourier transform, Infinite Fourier sine and cosine transforms, Inverse Fourier transforms, Inverse Fourier sine and cosine transforms, Convolution theorem (without proof), Parseval's identity-problems. Application Problems.	8	CO6

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics" Khanna Publishers, 43rd Edition, 2014 June, ISBN:9788174091956.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 9th Edition, 2007, ISBN: 9788126531356.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

References:

1. B.V. Ramana, "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006; ISBN:9780070634190.
2. M. K. Jain, S. R. K. Iyengar and R. K. Jain "Numerical Methods: For Scientific and Engineering Computation", New Age International Publications, 6th Edition, 2012, ISBN: 9788122433234.
3. Murray Speigel, Schaum;s Outline of "Advanced Mathematics for Engineers and Scientists", McGraw-Hill, 1971; ISBN: 9780070602168.

Self-study component :

UNIT 1: Weighted mean, Rank Correlation - Programming
UNIT 2: Region of convergence
UNIT 3: Fourier Integral Theorem -Proof
UNIT 4: Laplace Transform of Unit step function.
UNIT 5: Properties of Fourier Transform

ASSESSMENT PATTERN:

CIE – Continuous Internal Evaluation Theory (50 Marks)

Bloom's Category	Tests - 3 CIEs	Assignments - 1 No.	AAT - 1 No.
Marks (Out of 50)	**30**	**10**	**10**
Remember	10		02
Understand	10	05	02
Apply	10	05	02
Analyze			02
Evaluate			02
Create			

Assignment : One assignment (open book test normally) will be of 10 marks & conducted in between 1st test & 2nd test.

AAT - Alternate Assessment Tool : Surprise Test / Seminar / Role Play / Group Discussion / Case Study / E-Course Certification / Mini Projects / Developing Products / Building / Models / Paper Presentation / Paper / Poster Publication / Programming Contest / General Science / Technical Quiz / Hackathons / Demonstration / analysis / optimization / comparison of theoretical concepts using modern tools ……. One AAT to be submitted will be of 10 marks & submission in between 2nd & 3rd test.

SEE – Semester End Examination Theory (50 Marks)

Bloom's Category	Marks Theory (50)
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	

ANALOG ELECTRONIC CIRCUITS

Course Code : 18EC3DCAEC **Credits : 03**
L : P : T : S : 3 : 2 : 0 : 0 **CIE Marks : 50**
Exam Hours: 03 **SEE Marks : 50**
Total Hours: 40 **CIE + SEE Marks : 100**

COURSE OBJECTIVES:

1. Ability to design, conduct and analyze the concepts of Analog Electronic Circuits.
2. Evaluate the various BJT parameters, connections and configurations.
3. Understand the construction and characteristics of MOSFETs.
4. Demonstrate and generalize Frequency response of BJT at various frequencies.
5. Define, Demonstrate and Analyze Power amplifier circuits in different modes of operation.
6. Describe and Demonstrate Feedback and Oscillator circuits using BJT.

COURSE OUTCOMES:

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

CO1	Interpret the working principles of Diode, Transistors, Biasing concepts.
CO2	Illustrate the significance of Q-point, Stabilization factor and the operation of Transistor in various biasing configurations
CO3	Compute the electrical parameters of diode, transistor and MOSFET through re-model analysis and other methods
CO4	Apply the working principles of Transistors for various Oscillatory circuits.
CO5	Analyze the performance of Transistor for Low and High frequency signals, Cascade and Cascade connections, Feedback circuits and Power circuits
CO6	Design circuits using Transistors and MOSFET as Amplifiers, Power amplifiers and Oscillators

Mapping of Course outcomes to Program outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	2	2	1						1
CO2	3	2	1	1	2	1						1
CO3	3	2	2	2	2	1						1
CO4	2	1	1	1	1	1						1
CO5	3	2	1	1	1	1						1
CO6	2	1	1	1	2	1						1

Module	Course Content	Hours	COs
1	**Diode Applications:** Clippers and Clampers (problems) **Transistors**: Basic Characteristics of Transistor, **Biasing:** Operating point, Fixed bias circuits, Emitter biased circuits and Voltage divider bias circuits (exact and approx. analysis)., Stability factor, CE- stability factor, Advantages and disadvantages of different biasing methods.	08	CO1 CO2
2	**BJT AC (small signal) Analysis:** BJT modeling, **re transistor model**: Voltage-Divider Bias, CE Emitter-Bias Configuration, Emitter Follower Configuration and Darlington Connection, Cascaded Systems(problems). **FET Biasing**: Introduction, Construction and Operation of JFET, Fixed-Bias Configuration, Self-Bias Configuration, Voltage-Divider Biasing. Relevant problems.	08	CO3
3	**BJT Frequency Response**: Introduction, logarithms, decibels, general frequency considerations, **BJT low frequency response:** Impact of R_S and R_L on BJT low frequency response, Miller effect capacitance, **BJT high frequency response of Transistor Amplifier:** High frequency Model for CE amplifier, High frequency response of Cascaded CE stages. **Oscillators:** Effect of Positive Feedback, requirements of Oscillations, Oscillator operation, Phase shift Oscillator, Wien bridge Oscillator, Tuned Oscillator circuits, Crystal Oscillator. (BJT Version Only)	08	CO3 CO6
4	**MOSFETs:** Device structure and Physical operation(only Enhancement type MOSFET) (Device structure, Operation with varying voltage of V_{GS} and V_{DS} Derivation of i_D-V_{DS} relationship, Circuit Symbol, The i_D-V_{DS} Characteristics, Finite Output resistance, Role of Substrate) relevant problems **Biasing in MOS Amplifier Circuits**: Biasing by Fixing VGS , Biasing by Fixing VG and Connecting a Resistance in the Source, Biasing Using a Drain-to-Gate Feedback Resistor, Biasing Using a Constant-Current Source	08	CO5 CO6

5	**Feedback Amplifiers:** General Feedback Structure, Properties of Negative Feedback. **Power amplifiers:** Introduction – definitions and amplifier types, series fed class A amplifier, transformer coupled class A amplifier, Design Theory, Power Amplifier Design, Variation of output power with load, Class B amplifier operation, Transformer Coupled Push-Pull Circuits, Complementary –Symmetry Circuits, Amplifier Distortion, Relevant Problems.	**08**	**CO5**

NOTE:

1. Questions for CIE and SEE not to be set from self-study component.
2. Assignment Questions should be from self-study component only.

SELF-STUDY COMPONENT

UNIT 1 : PNP transistors, Stability factor for CB, CC configuration, Transistor switching networks, BJT as a Switch
UNIT 2 : Effect of R_L and R_S, Cascode connections
UNIT 3 : Multistage Amplifiers, FET frequency response, FET Version of oscillators
UNIT 4 : Applying Shockley's Equation, P-Channel Depletion Type MOSFET and Symbols, P-Channel Enhancement Type MOSFET and Symbols, CMOS
UNIT 5 : Power transistor heat sink

TEXT BOOK :

1. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", PHI/Pearson Education., 10th Edition, ISBN: 9788131727003.
2. Allen Mottershead, "Electronics Devices and Circuits" Prentice Hall of India. ISBN: 9788120301245, 8120301242
3. Adel Sedra and K.C. Smith, "Microelectronic Circuits", 5th Edition, Oxford University Press, International Version, 2009.
4. U.B. Mahadevaswamy, "Analog Electronics Circuits: A Simplified Approach", Pearson / Sanguine, 2007.

REFERENCES BOOKS:

1. Jacob Millman & Christos C. Halkias, "Integrated Electronics", Tata - McGraw Hill, 2nd Edition, 2010
2. David A. Bell, "Electronic Devices and Circuits", PHI, 4th Edition, 2004.
3. J. Nagrath, "Electronics: Analog and Digital", PHI.

ASSESSMENT PATTERN:

CIE – Continuous Internal Evaluation Theory (50 Marks)

Bloom's Category	Tests - 3 CIEs	Assignments - 1 No.	AAT - 1 No.
Marks (Out of 50)	**30**	**10**	**10**
Remember	10		01
Understand	10	05	03
Apply	10	05	03
Analyze			03
Evaluate			
Create			

Assignment : One assignment (open book test normally) will be of 10 marks & conducted in between 1st test & 2nd test.

AAT - Alternate Assessment Tool : Surprise Test / Seminar / Role Play / Group Discussion / Case Study / E-Course Certification / Mini Projects / Developing Products / Building / Models / Paper Presentation / Paper / Poster Publication / Programming Contest / General Science / Technical Quiz / Hackathons / Demonstration / analysis / optimization / comparison of theoretical concepts using modern tools ……. One AAT to be submitted will be of 10 marks & submission in between 2nd & 3rd test.

SEE – Semester End Examination Theory (50 Marks)

Bloom's Category	Marks Theory (50)
Remember	10
Understand	20
Apply	10
Analyze	10
Evaluate	
Create	

DIGITAL ELECTRONICS

Course Code : 18EC3DCDEC **Credits : 03**
L : P : T : S : 3 : 0 : 0 : 0 **CIE Marks : 50**
Exam Hours: 03 **SEE Marks : 50**
Total Hours: 40 **CIE + SEE Marks : 100**

Course Objectives :

1. Illustrate, understand and analyze simplification of algebraic equations using K-Maps and variable entered mapping technique.
2. Define and describe operations of Decoders, Encoders, Multiplexers, Carry look ahead adder and Binary comparators.
3. Define and describe Flip-Flops, Counters and Registers.
4. Design and analysis of counters.
5. Design and develop Mealy and Moore models for digital circuits.

Course Outcomes : At the end of the course, student will be able to:

COs	Outcomes / PO / Blooms Level
CO1	Apply the knowledge of Combinational Logic, TTL logic families and simplification techniques using Karnaugh Maps. (PO1 & Level 3)
CO2	Analyze the operation of Decoders, Encoders, Multiplexers, Carry look ahead adders and Comparators. (PO1, PO2 & Level 4)
CO3	Illustrate the operation of Latches, Flip Flops, Counters and Shift Registers. (PO1, PO2 & Level 3)
CO4	Design combinational and sequential circuits. (PO1, PO2, PO3 & Level 5)
CO5	Analyze Mealy and Moore Models for digital circuits and Design Synchronous Sequential Circuits, State diagrams and Programmable Logic Devices. (PO1, PO2, PO3, PO4 & Level 4,5)
CO6	Implement applications of combinational and sequential circuits using hardware and simulation tool. (PO1, PO2, PO3, PO4, PO5, PO9, PO10 & Level 3)

Mapping of Course outcomes to Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	1	-	-	-	-	-	-	-	-
CO6	3	3	1	1	2	-	-	-	3	2	-	-

Module	Contents of the Unit	Hours	COs
1	**Introduction to Logic Families:** Introduction, Characteristic of Digital ICs, Fan-In, Fan-Out, Propagation delays, Noise Margins, Current sourcing and Current sinking, TTL NAND circuit description and operation. **Principles of combinational logic**: Definition of combinational logic, Canonical forms, Generation of switching equations from truth tables, Karnaugh maps-3, 4 and 5 variables, Incompletely specified functions (Don't Care terms), VEM Technique	08	CO1
2	**Analysis and design of combinational logic**: General approach, Decoders, Encoders, Digital multiplexers, using multiplexers as Boolean function generators. Adders and Subtractors, Cascading full adders, Ripple carry adder, Carry Look Ahead Adder, Binary comparators.	08	CO1 CO2 CO4
3	**Sequential Circuits 1:** Basic Bistable Element, Latches, SR Latch, Application of SR Latch, A Switch Debouncer, The Clocked SR Flip Flop, JK Flip Flop, The Master-Slave JK Flip-flop, Edge Triggered Flip-Flops. Characteristic equation and Timing diagram of Flip-Flop circuits.	08	CO3
4	**Sequential Circuit 2:** Counters - Binary Ripple Counters, Design of Asynchronous mod N counters, Synchronous Binary counters, Design of a synchronous mod-n counter using clocked JK, D, T and SR flip-flops. Registers, Counters based on registers.	08	CO3 CO4
5	**Finite State Machine Design:** Introduction, Mealy and Moore Models, State Machine Notation, Synchronous Sequential Circuit Analysis and Design: Transition equations, Transition tables, Excitation tables, state tables and state diagrams. **Memory and Programmable Logic Devices**: Random Access-Memory, Timing waveforms, Read Only Memory, Programmable logic devices (PROM, Programmable Logic Array, Programmable Array Logic Devices), implementation of combinational circuits using PLDs.	08	CO5

Note:

1. Questions for CIE and SEE not to be set from self-study component.
2. Assignment Questions should be from self-study component only.

Self-Study component:

UNIT 1 : Quine-McCluskey minimization technique,.
UNIT 2 : Design methods of building blocks of combinational logics.
UNIT 3 : Conversion of Flip-Flops
UNIT 4 : Case study of Sequence generator.
UNIT 5 : Construction of state Diagrams, Counter Design.

Text Books:

1. Donald D Givone, "Digital Principles and Design", Tata McGraw Hill Edition, 2002.
2. R.P. Jain, "Modern Digital Electronics", Tata McGraw-Hill Education, 4th edition.
3. M Morris Mono, "Digital Logic and computer design", Prentice Hall.

Reference Books:

1. Charles H Roth, Jr., "Fundamentals of logic design", Thomson Learning, 2004.
2. Mono and Kim, "Logic and computer design Fundamentals", Pearson, Second Edition, 2001.
3. Ronald J Tocci, Neal S. Wildmer, and Gregory L. Moss, "Digital Systems: Principles and Applications", Pearson, 9th Edition.
4. William I. Fletcher, "An Engineering Approach to Digital Design", Prentice-Hall, 1980

Assessment Pattern:

CIE – Continuous Internal Evaluation Theory (50 Marks)

Bloom's Category	**Tests**	**Assignments**	**AAT**
Marks (Out of 50)	**30**	**10**	**10**
Remember	05		02
Understand	10	05	04
Apply	10	05	02
Analyze	05		02
Evaluate			
Create			

Assignment : One assignment (open book test normally) will be of 10 marks & conducted in between 1st test & 2nd test.

AAT - Alternate Assessment Tool : Surprise Test / Seminar / Role Play / Group Discussion / Case Study / E-Course Certification / Mini Projects / Developing Products / Building / Models / Paper Presentation / Paper / Poster Publication / Programming Contest / General Science / Technical Quiz / Hackathons / Demonstration / analysis / optimization / comparison of theoretical concepts using modern tools ……. One AAT to be submitted will be of 10 marks & submission in between 2nd & 3rd test.

SEE –Semester End Examination Theory (50 Marks)

Bloom's Category	**Marks Theory (50)**
Remember	10
Understand	10
Apply	10
Analyze	20
Evaluate	
Create	

ELECTRICAL CIRCUIT ANALYSIS

Course Code : 18EC3DCECA **Credits : 03**
L : P : T : S : 3 : 0 : 0 : 0 **CIE Marks : 50**
Exam Hours: 03 **SEE Marks : 50**
Total Hours: 40 **CIE + SEE Marks : 100**

COURSE OBJECTIVES:

1. To make students understand and apply basic electrical engineering laws like KCL and KVL for ac and dc circuits.
2. To make students analyze and apply various network reduction techniques to solve dc and ac circuits.
3. To make students to determine two-port network parameters.
4. To provide students with the knowledge of various network theorems.
5. To familiarize students with series and parallel resonance of electrical networks.
6. To make students analyze transient and steady state behavior of electrical networks.

COURSE OUT COMES:

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

CO 1	**Apply** basic electrical engineering knowledge to illustrate the concepts of network- behavior and reduction techniques.
CO 2	**Analyze** and **solve** engineering problems by applying various network theorems.
CO 3	**Examine** two port network for the given z, y, h, T parameter specifications.
CO 4	**Distinguish** the contrast characteristics of series and parallel resonance.
CO 5	**Apply** differential equation knowledge of mathematics and basics of electrical engineering for analyzing and solving steady state, transient behavior of electrical networks. Apply knowledge of Laplace transforms, to perform time domain analysis of linear passive networks.
CO 6	**Work** as an individual to use the modern engineering simulation tools to (i) verify network theorems (ii) analyze the super node and super mesh network concepts (iii) obtain response of series and parallel resonant circuits.

Mapping of Course Outcomes to Program Outcomes:

CO'S\ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	1	-	2	-	-	1	1	1	-	1	1	-

Module	Course Content	Hours	CO's
1	**Basic Concepts**: Basic definitions. Practical sources, Source transformations and source shift, Network reduction using Star–Delta transformation, Kirchhoff's Laws, Loop and node analysis with linearly dependent and independent sources for DC and AC networks (including super mesh and super node).	**08**	**CO 1 CO6**
2	**Networks Theorem**: Superposition theorem, Thevenin's and Norton's theorems, Maximum Power transfer theorem, numerical problems based on all mentioned theorems.	**08**	**CO2 CO6**
3	**Two port network parameters**: Definition of z, y, h and transmission parameters, modeling with these parameters, and relationship between parameters sets.	**08**	**CO3 CO6**
4	**Resonant Circuits**: Properties of Series Resonant circuit, Q factor, Bandwidth, Selectivity of Series Resonant. Application of Series Resonant circuit with numerical problems. Properties of parallel resonance circuit, frequency-response of parallel resonance circuit, Selectivity and Bandwidth. Application of parallel resonance circuit with numerical problems.	**08**	**CO4 CO6**
5	**Transient behavior and initial conditions**: Behavior of circuit elements under switching condition and their representation, evaluation of initial and final conditions in RL, RC and RLC circuits for DC excitations. **Laplace Transformation:** Solution of networks.	**08**	**CO5**

NOTE:

1. Questions for CIE and SEE not to be set from self-study component.
2. Assignment Questions should be from self-study component only.

SELF STUDY COMPONENT:

Unit-2 : Network Topology: Graph of a network, Concept of tree and co-tree, incidence matrix, Tie-set and cut-set schedules, Formulation of equilibrium equations in matrix form, Solution of resistive networks.
Unit-4 : Evaluation of initial and final conditions in RL, RC, and RLC circuits for AC excitations.
Unit-5 : Initial and final value theorem. Waveform synthesis.

TEXT BOOKS:

1. Engineering Circuit Analysis, Hayt, Kemmerly and Durbin, TMH, 7th Edition, 2010
2. Networks and systems, Roy Choudhury, New Age International Publications., 2nd edition, 2006 re-print.
3. Network Analysis A simplified Approach, K. ChannaVenkatesh, D. Ganesh Rao, Fillip Learning, 2nd Edition, 2012

REFERENCE BOOKS :

1. Electric Circuits, Schaum's Outlines, M Nahvi & J A Edminister, TMH, 5th Edition, 2009.
2. Network Analysis, M.E. Van Valkenburg, PHI, 3rd Edition, Reprint 2009.
3. Analysis of Linear Systems, David K. Cheng, Narosa Publishing House, 11th reprint, 2002.

ASSESSMENT PATTERN

CIE – Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Tests**	**Assignments**	**AAT**
Marks (out of 50)	**30**	**10**	**10**
Remember	3		2
Understand	2		
Apply	8	4	4
Analyze	7	4	2
Evaluate	8	2	2
Create	2		

Assignment : One assignment (open book test normally) will be of 10 marks & conducted in between 1st test & 2nd test.

AAT - Alternate Assessment Tool : Surprise Test / Seminar / Role Play / Group Discussion / Case Study / E-Course Certification / Mini Projects / Developing Products / Building / Models / Paper Presentation / Paper / Poster Publication / Programming Contest / General Science / Technical Quiz / Hackathons / Demonstration / analysis / optimization / comparison of theoretical concepts using modern tools, solution of networks using modern tools. ……. One AAT to be submitted will be of 10 marks & submission in between 2nd & 3rd test.

SEE- Semester End Examination (50 Marks)

Bloom's Category	**Marks Theory (50)**
Remember	5
Understand	5
Apply	13
Analyze	10
Evaluate	13
Create	4

ELECTRO MAGNETIC FIELD THEORY

Course Code : 18EC3DCEMF **Credits : 04**
L : P : T : S : 4 : 0 : 0 : 0 **CIE Marks : 50**
Exam Hours : 03 **SEE Marks : 50**
Total hours : 50 **CIE + SEE Marks : 100**

COURSE OBJECTIVES:

- To study 3-dimensional systems and represent points in space.
- To study the concepts of electric and magnetic fields in 3-dimension.
- To learn theorems and laws related to electric and magnetic field.
- To derive Maxwell equations both for static and time varying fields.
- To relate field theory and circuit theory.

COURSE OUTCOMES:

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

CO1	Apply concepts of 3-dimensional systems to identify point charges.
CO2	Employ laws of electric field such as coulomb's law, Gauss law, Poisson and Laplace equations to bring out the circuit concepts such as Energy, Voltage, Current and capacitor.
CO3	Apply laws related to magnetic field such as Biot Savart law, Ampere's circuital law and Stoke's theorem to bring out concepts of Force, torque and Inductance.
CO4	Solve application problems using laws and theorems of field theory such as analysis of boundary conditions for different dielectric mediums.
CO5	Identify Maxwell's Equations for static field and time varying fields.
CO6	Develop animations/simulations for field theory concepts using modern simulation tools.

Mapping of Course outcomes to Program outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	1	1	1	-	-	-	-	-	-	-

Module	Course Content	Hours	COs	Text1
1	**Three-Dimensional Coordinate Systems: T**hree dimensional Coordinate systems-Cartesian, vector components and unit vectors, cylindrical and Spherical coordinate systems, equations of conversion from one coordinate system to the other. (No derivation or proof of conversion from one coordinate system to another)	**04**	**CO1 CO2 CO6**	1.3 1.4 1.8 1.9 1.10
	Coulomb's Law and Electric field intensity: Coulomb's law of charges, Electric field intensity, field of n point charges, charge distributions, field due to line charge-derivation, expressions for area and volume charge distributions (no derivation).	**04**		2.1 2.2 2.3 2.5 2.6
2	**Electric flux density, Gauss' law and divergence:** Electric flux density, Gauss' law, Application of gauss law to differential element, Divergence, Maxwell's First equation (Electrostatics), vector operator ∇ and divergence theorem**.**	**04**	**CO1 CO2 CO5 CO6**	3.1 3.2 3.5 3.6 3.7
	Energy and potential : Energy expended in moving a point charge in an electric field, The line integral, Definition of potential difference and Potential, The potential field of a point charge, Potential gradient , Energy density in an electrostatic field equation(no derivation).	**04**		4.1 4.3 4.4 4.6 4.8
3	**Conductors, dielectrics and capacitance:** Current and current density, Continuity of current, Nature of dielectric materials, boundary conditions for perfect Dielectrics, capacitance, several capacitance examples.	**04**	**CO1 CO2 CO4 CO5 CO6**	5.1 5.2 5.6 5.7 5.8 5.9
	Poisson's and Laplace's equations: Poisson's and Laplace's Equations, Uniqueness theorem (statement only), Examples of the solutions to Laplace's equations (One dimensional only).	**04**		7.1 7.2 7.3
4	**The steady magnetic field:** Biot-Savart law, Ampere's circuital law, Curl, Stokes' theorem, magnetic flux and flux density, scalar and Vector magnetic potentials (only definitions with equations).	**04**	**CO1 CO3 CO5 CO6**	8.1 8.2 8.3 8.4 8.5 8.6
	Magnetic forces: Force on a moving charge and differential current element, Force between differential current elements, Force and torque on a closed circuit.	**04**		9.1 9.2 9.3 9.4

5	**Magnetic materials and inductance:** Magnetization and permeability, Magnetic boundary conditions, Magnetic circuit, Potential energy and forces on magnetic materials, Inductance and Mutual Inductance.	**04**	**CO3** **CO4** **CO5** **CO6**	9.6 9.7 9.8 9.9 9.10
	Time varying fields and Maxwell's equations: Faraday's law**,** displacement current, Maxwell's equation in point and Integral form**,** retarded potentials**.**	**04**		10.1 10.2 10.3 10.4 10.5

NOTE:

1. Questions for CIE and SEE not to be set from self-study component.

SELF STUDY COMPONENTS:

UNIT 1 : Review of vectors and vector algebra-simple problems, MATLAB simulations
UNIT 2 : Application of Gauss law-Some symmetrical charge distributions, MATLAB simulation
UNIT 3 : Metallic conductors, Conductor properties and boundary conditions, Semiconductors
UNIT 4 : Derivation of steady magnetic field laws
UNIT 5 : Nature and classification of magnetic materials, MATLAB simulations

TEXT BOOKS:

1. Engineering Electromagnetics, William H Hayt Jr. and John A Buck, Tata Mc Graw-Hill, 7th edition, 2006.
2. Electromagnetics with Applications, John Krauss and Daniel A Fleisch, McGraw-Hill, 5th edition, 1999.
3. Electromagnetics B. B. Laud, New Age International (P) Ltd. N Delhi (1987)

REFERENCE BOOKS:

1. Elements of Electromagnetic, Mathew N.O Sadiku, New York – Oxford University Press, Fourth Edition, 2007.
2. Field and Wave Electromagnetics, David K Cheng, Pearson Education Asia, 2nd edition, 1989, Indian Reprint – 2001.
3. Fundamentals of Electromagnetics with MATLAB, Karl Lonngen, Sava Savov, Randy J. Jost, PHI-second Edition-2012
4. Field Theory, S P Basavaraju, India, Subhash Stores, Edition 2007.

ASSESSMENT PATTERN:

CIE – Continuous Internal Evaluation Theory (50 Marks)

Bloom's Category	Tests	Assignments	AAT
Marks (Out of 50)	**30**	**10**	**10**
Remember	10		
Understand	10		05
Apply	10	05	05
Analyze		05	
Evaluate			
Create			

Assignment : One assignment (open book test normally) will be of 10 marks & conducted in between 1st test & 2nd test.

AAT - Alternate Assessment Tool : Surprise Test / Seminar / Role Play / Group Discussion / Case Study / E-Course Certification / Mini Projects / Developing Products / Building / Models / Paper Presentation / Paper / Poster Publication / Programming Contest / General Science / Technical Quiz / Hackathons / Demonstration / analysis / optimization / comparison of theoretical concepts using modern tools, solution of networks using modern tool, Animations to understand concepts of 3 dimensional coordinate systems, MATLAB simulation programs to understand concepts of electric field, magnetic field, charge distributions, Gauss law, capacitance, boundary conditions, divergence, curl, Magnetic circuits, etc……. One AAT to be submitted will be of 10 marks & submission in between 2nd & 3rd test.

SEE – Semester End Examination Theory (50 Marks)

Bloom's Category	Marks Theory (50)
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	

ELECTRONIC INSTRUMENTATION

Course Code : 18EC3DCENI **Credits : 03**
L : P : T : S : 3 : 0 : 0 : 0 **CIE Marks : 50**
Exam Hours : 03 **SEE Marks : 50**
Total hours : 40 **CIE + SEE Marks : 100**

COURSE OBJECTIVES:

1. To gain knowledge about operation and electrical characteristics of different electronic measuring instruments.
2. To understand the method of working of digital voltmeter, signal generator, CRO, Various display devices and transducer for an efficient measurement.
3. To analyze and select the appropriate signal generator, CRO, Various display devices and transducer for an efficient measurement.
4. To analyze time and frequency measurement and the use of spectrum analyzer.
5. To apply the bridges for the measurement of R, L and C.
6. To examine about the RF power measurement.

COURSE OUTCOMES: After completion of the course, the graduates will be able to

CO1	**Interpret** voltage, time and frequency measurement of electronic measuring instruments.
CO2	**Illustrate** various measurement methods employed in digital meters.
CO3	**Apply** AC /DC bridge concepts to measure R L C, Q factor and frequency and power parameters.
CO4	**Analyze** the working of different types of CRO's, signal generators.
CO5	**Categorize** different transducers, display devices, and **illustrate** its working for various applications.
CO6	Analyze, Present /use modern tools to interpret various measuring systems

Mapping of Course outcomes to Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	3	1	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-
CO6	3	2	2	1	2	-	-	1	2	2	-	-

Unit	Course Content	Hours	COs
1	**Digital Instruments:** Digital Voltmeters–Introduction, DVM's based on V–T,V–F and Successive approximation principles, Resolution and sensitivity, Digital multi meter, Digital frequency meters. Digital measurement of time: time base selector, measurement of time	08	CO1 CO2
2	**Special Oscilloscopes:** Dual beam and dual trace CROs, Analog storage, Sampling and Digital storage oscilloscopes. Spectrum analyzer.	08	CO2 CO4
3	**Signal Generators:** Introduction, Fixed and variable AF oscillator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator, Frequency synthesizer.	08	CO2 CO4
4	**Measurement of resistance, inductance and capacitance:** Wheatstone's bridge, Kelvin Bridge; AC bridges, Capacitance Comparison Bridge, Maxwell's bridge, Wien's bridge (both qualitative and quantitative analysis). **Measurement of power**: requirement of Dummy load, Bolometer method of power measurement, measurement of power by bolometer bridge, Unbalanced bolometer bridge, Self balancing bolometer bridge, Measurement of large amount of RF power	08	CO2 CO3
5	**Transducers:** Introduction-Electrical transducer, Resistive transducer, Resistive position transducer, Strain gauges, Inductive transducer, Differential output transducers and LVDT, Opto- electronics transducers, Ultrasonic flow transducers **Display devices**: Digital display system, classification of display, Display devices: LED, LCD and segment displays	08	CO1 CO5

NOTE:

1. Questions for CIE and SEE not to be set from self-study component.
2. Assignment Questions should be from self-study component only.

SELF STUDY COMPONENT:

UNIT 1: Counters: Universal, Decade, Electronic
UNIT 2: Logic Analyzer.
UNIT 3: Standard signal generator.
UNIT 4: Microprocessor controlled bridges, Resonance Bridge
UNIT 5: Temperature Transducers- RTD, Thermocouple.

TEXT BOOKS

1. Electronic Instrumentation, H. S. Kalsi, TMH, 2004
2. Electronic Instrumentation and Measurements, David A. Bell, PHI / Pearson Education, 2006.
3. Electronic Measurements and Instrumentation, Dr. R.S. Sedha, S. Chand & company, first edition, 2013.

REFERENCE BOOKS

1. Principles of measurement systems, John P. Beately, 3rd Edition, Pearson Education, 2000
2. Modern electronic instrumentation and measuring techniques, Cooper D& AD Helfrick, PHI,1998.
3. Electronics & electrical measurements, A K Sawhney, Dhanpat Rai& sons, 9th edition.

ASSESSMENT PATTERN:

CIE – Continuous Internal Evaluation Theory (50 Marks)

Bloom's Category	**Tests**	**Assignments**	**AAT**
Marks (Out of 50)	**30**	**10**	**10**
Remember	--	--	02
Understand	10	--	02
Apply	10	05	02
Analyze	05	05	04
Evaluate	05		
Create			

Assignment : One assignment (open book test normally) will be of 10 marks & conducted in between 1st test & 2nd test.

AAT - Alternate Assessment Tool : Surprise Test / Seminar / Role Play / Group Discussion / Case Study / E-Course Certification / Mini Projects / Developing Products / Building / Models / Paper Presentation / Paper / Poster Publication / Programming Contest / General Science / Technical Quiz / Hackathons / Demonstration / analysis / optimization / comparison of theoretical concepts using modern tools, solution of networks using modern tools. ……. One AAT to be submitted will be of 10 marks & submission in between 2nd & 3rd test.

SEE – Semester End Examination Theory (50 Marks)

Bloom's Category	Marks Theory (50)
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	

ANALOG ELECTRONIC LAB

Course Code : 18EC3DLAEL **Credits : 02**
L : P : T : S : 2 : 0 : 2 : 0 **CIE Marks : 50**
Exam Hours : 03 **SEE Marks : 50**
Total Hours : 26 **CIE + SEE Marks : 100**

COURSE OBJECTIVES :

1. To use Electronic Components such as DC, AC power supply, Signal Generator, CRO, Multi meter adjustments and wiring of components.
2. To measure various parameters such as current and voltage of a circuit and various performance characteristics of the circuit
3. To measure the various types of distortions in the received signal.
4. To measure the total resistance/impedance of the circuit and to find the condition at which maximum power can be transferred to the load.
5. To design an amplifier circuit and to measure the performance for different frequency signals.
6. To generate signals of desired frequency.

COURSE OUTCOMES:

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

CO1	Design rectifiers, clippers and clamper circuits.
CO2	Verification of Thevenin's and Maximum Power Transfer circuits
CO3	Resonance circuits to know the condition at which max frequency is obtained at the output
CO4	To design BJT and FET based RC Coupled amplifier to measure the amplified signals voltage, current, frequency, equivalent input, output impedance of the circuit & the frequency band to which the circuit responds.
CO5	To generate signals of desired frequency using Oscillator circuits.
CO6	Ability to analyze the working operation of voltage follower with current amplification & determine the efficiency of class B push pull power amplifier.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	1	1	-	-	-	-
CO2	3	2	2	-	-	-	-	-	1	1	-	-	-	-
CO3	3	2	1	-	-	-	-	-	1	1	-	-	-	-
CO4	3	2	2	-	-	-	-	-	1	1	-	-	1	-
CO5	3	2	2	-	-	-	-	-	1	1	-	-	1	-
CO6	2	1	1	-	-	-	-	-	1	1	-	-	1	-

Expt. No.	Experiment name	Hours	CO's
1	Testing of Diode clipping (Single/Double ended) circuits for peak clipping, peak detection.	03	CO1
2	Testing of Clamping circuits: positive clamping /negative clamping.	03	CO1
3	Testing of Half wave, Full wave and Bridge Rectifier circuits with and without Capacitor filter. Determination of ripple factor, regulation and efficiency	03	CO1
4	Verification of Thevenin's Theorem and Maximum Power Transfer theorem for DC Circuits.	03	CO2
5	Characteristics of Series and Parallel resonant circuits.	03	CO2
6	Wiring of RC coupled Single stage FET & BJT amplifier and determination of the gain-frequency response, input and output impedances.	03	CO4
7	Wiring of BJT Darlington Emitter follower with and without bootstrapping and determination of the gain, input and output impedances (Single circuit) (One Experiment).	03	CO6
8	Wiring of a two stage BJT Voltage series feedback amplifier and determination of the gain, Frequency response, input and output impedances with and without feedback (One Experiment).	03	CO6
9	Wiring and Testing for the performance of BJT-RC Phase shift Oscillator for $f_o \leq 10$ KHz.	03	CO5
10	Testing for the performance of BJT –Colpitts Oscillators for RF range $f_o \geq 100$KHz.	03	CO5
11	Testing for the performance of BJT – Crystal Oscillators for RF range $f_o \geq 100$KHz.	03	CO5
12	Testing for the performance of BJT – Hartley Oscillators for RF range $f_o \geq 100$KHz.	03	CO5
13	Class – B push pull power amplifier and determination of its conversion efficiency.	03	CO6

SELF-STUDY COMPONENT

1. Characteristics of MOSFET.
2. Design of Oscillator circuits using JFET.

Assessment Pattern:

CIE – Continuous Internal Evaluation Lab (50 Marks)
SEE – Semester End Examination Lab (50 Marks)

Bloom's Category	**Performance (Day To Day)**	**Internal Test**
Marks (Out of 50)	**25**	**25**
Remember		
Understand		
Apply	05	05
Analyze	10	10
Evaluate	05	05
Create	05	05

Bloom's Category	**Marks Theory (50)**
Remember	-
Understand	5
Apply	15
Analyze	10
Evaluate	10
Create	10

DIGITAL ELECTRONICS LAB

Course Code : 18EC3DLDEL **Credits :** 02
L : P : T : S : 2 : 0 : 2 : 0 **CIE Marks :** 50
Exam Hours : 03 **SEE Marks :** 50
Total Hours : 26 **CIE + SEE Marks** : 100

Course Objectives : At the end of the course, student will be able to

This laboratory course enables students to get practical experience in design, realization and verification of

1. SOP and POS forms.
2. Half / Full adder and Half / Full Subtractors using logic gates
3. Parallel adder and code converters.
4. Multiplexer using logic gate and IC
5. De-multiplexer / Decoder using logic gate and IC
6. Flip Flops, Counters and Shift register.

Course Outcomes: At the end of the course, student will be able to:

CO1	Demonstrate the truth table of various expressions and Combinational circuits using logic gates.
CO2	Construct, realize and test combinational circuits.
CO3	Construct, realize and test sequential circuits.
CO4	Design and evaluate combinational circuits.
CO5	Design and evaluate sequential circuits like counters using ICs.
CO6	Apply the knowledge of shift registers into applications like Ring counter, Johnson counter and Sequence generator.

Mapping of Course Outcomes to Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	-	-	-	-	-	-	2	-	-	-
CO2	2	2	1	-	-	-	-	-	2	-	-	-
CO3	2	2	1	-	-	-	-	-	2	-	-	-
CO4	2	2	2	-	-	-	-	-	2	-	-	-
CO5	2	2	2	-	-	-	-	-	2	-	-	-
CO6	2	2	2	-	-	-	-	-	2	-	-	-

Expt. No.	Contents of the Experiment	Hours	COs
1	Simplification, realization of Boolean expressions using logic gates/Universal gates.	03	CO1 CO2
2	Realization of Half / Full adder and Half / Full Subtractors using logic gates.	03	CO2
3	Using 7483 chip (i) Realization of parallel adder / Subtractors (ii) BCD to Excess-3 code conversion and vice versa.	02	CO2
4	Realization of Binary to Gray code conversion and vice versa.	02	CO4
5	MUX / DEMUX – use of 74153, 74139 for arithmetic circuits and code converter.	02	CO5
6	Realization of One / Two bit comparator and study of 7485 magnitude comparator.	02	CO4
7	Use of a) Decoder chip to drive LED display b) Priority encoder.	02	CO2
8	Truth table verification of Flip-Flops: (i) JK Master slave (ii) T type and (iii) D type.	02	CO3
9	Design and Realization of 3 bit counters as a sequential circuit and MOD– N counter (7476, 7490, 74192, 74193).	02	CO3 CO5
10	Shift left; Shift right, SIPO, SISO, PISO, PIPO operations using 74LS95	02	CO3
11	Wiring and testing Ring counter/Johnson counter	02	CO6
12	Wiring and testing of Sequence generator.	02	CO6

Assessment Pattern:

CIE – Continuous Internal Evaluation Lab (50 Marks)
SEE – Semester End Examination Lab (50 Marks)

Bloom's Category	Performance (Day To Day)	Internal Test
Marks (Out of 50)	**25**	**25**
Remember		
Understand		
Apply	05	05
Analyze	10	10
Evaluate	05	05
Create	05	05

Bloom's Category	Marks Theory (50)
Remember	-
Understand	5
Apply	15
Analyze	10
Evaluate	10
Create	10