DEPARTMENT

OF

ELECTRONICS & COMMUNICATION ENGINEERING

SCHEME & SYLLABUS

Of

UG - B.E. COURSE

IV Semester – Jan to Jun 2020

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

Autonomous Course

Batch : 2018-22

Dayananda Sagar College of Engineering
Shavige Malleshwara Hills, Kumaraswamy Layout,
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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 & NIRF Rated)

About the college & the department

Dayananda Sagar College of Engineering (DSCE), started in the year 1979, was founded by the Late Sri R. Dayananda Sagar under the aegis of Mahatma Gandhi Vidya Peeta Trust (MGVP, Estd. 1960). DSCE has got widest choice of engineering branches having 15 Under Graduate courses & 13 Post Graduate courses and is currently an autonomous institution under the Visvesvaraya Technological University. 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. Dayananda Sagar College of Engineering (DSCE) is approved by All India Council for Technical Education (AICTE), Govt. of India and affiliated to Visvesvaraya Technological University (VTU), Belagavi, Karnataka. DSCE is accredited by NAAC, NBA and has ISO certification with All India NIRF ranking. In addition to the different institutions, it has got 20 Research Centres in different branches of Engineering catering to research scholars for obtaining Ph.D under VTU.

One of the vibrant & oldest department is the ECE dept. & is the biggest in the DSI group with 50+ staffs & 1000+ students with 12 Ph.D.'s & more than 35+ staffs pursuing their research in various universities across the country. At present, the department runs a UG programme (BE - ECE) with an intake of 240 (1 regular program of 180 intake & a second shift program of 60 intake) with 2 PG programmes (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 11 sophisticated labs catering to different ECE subjects, Texas Instruments Centre of Excellence 13 class rooms, a Full-fledged VTU R & D centre, a board room, etc… The Department of ECE was started in the year 1979 with an intake of 60 and has achieved a very good academic and research track record till date in all round aspects at the national & international levels. Currently, DSCE is an autonomous institution affiliated to the VTU, Belagavi. Funded projects of more than Rs. 1 Crore from DST, DRDO, ISRO, etc... are under progress in the department with couple of projects already completed worth more than Rs. 40 lakhs. The department has highly qualified, trained & dedicated faculty having rich Industry and research experience belonging to varied specializations in the field of Electronics & Communication Engineering.

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
IV SEMESTER ECE (AUTONOMOUS COURSE)
2018-2022 BATCH
2018 SCHEME / 175 CREDITS

Sl. No	Course Code	Course Title	Teaching Department	Teaching Hours / Week			Examination			Credits
				Theory Lecture	Tutorial	Practical/ Drawing	CIE Marks	SEE Marks	Total Marks	
				L	T	P				
1	18MA4GCCVD	Complex Variables and Distributions	MAT	3	--	--	50	50	100	3
2	18EC4DCSAS	Signal & Systems	ECE	4	1*	--	50	50	100	4
3	18EC4DCCOT	Communication Theory	ECE	3	0	--	50	50	100	3
4	18EC4DCLIC	Linear Integrated Circuits & Applications	ECE	3	1*	--	50	50	100	3
5	18EC4DCMIC	Microcontroller	ECE	3	0	--	50	50	100	3
6	18EC4DCCSE	Control System Engineering	ECE	3	1*	--	50	50	100	3
7	18EC4DLMCL	Microcontroller Lab	ECE	--	2	2	50	50	100	2
8	18EC4DLACL	Analog Communications & Linear Integrated Circuits Lab	ECE	--	2	2	50	50	100	2
9	18HS4ICKAN 18HS4ICCIP	Kannada Constitution of India & Professional Ethics (CIPE)	HSS	1	--	--	50	--	50	1
TOTAL				**20**	**07**	**04**	**450**	**400**	**850**	**24**

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 IV semester of Engineering programs

10	17MA4IMMAT	Advanced Mathematics II (Non-Credit Course)	Mathematics	4	--	--	50	--	50	--

(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 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.

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

Courses prescribed to lateral entry B.Sc. degree holders admitted to IV 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.

* tough mathematical subjects introduced tutorial classes to solve additional problems

Complex Variables and Distributions
UG – IV Semester (Common to EC, TC, EE, ML, EI, IS)

Course Code : 18MA4GCCVD
L : P : T : S : 3 : 0 : 1 : 0
Exam Hours : 03
Total Hours : 40

Credits : 03
CIE Marks : 50
SEE Marks : 50
CIE + SEE Marks : 100

Course Objectives:

1. To introduce the topics of vector space and graph theory
2. To understand theory of complex variables
3. To provide the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science

CO1	Acquire an overview of the concepts and simple techniques in Graph Theory and vector spaces
CO2	Understand the significance of analytical functions and contour integration.
CO3	Understand the basic concepts of random variables and probability distributions
CO4	Explain sampling distributions and test the hypothesis for a given sample
CO5	Understand the basic concepts of Joint Probability distribution
CO6	Specify a given discrete time Markov chain in terms of a transition matrix and a transition diagram

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

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	**Linear Algebra & Graph Theory** **Linear Algebra:** Vector space, Linear dependence, Dimension & basis, Linear transformations, Matrix representation of linear transformation. Definition, Types of graph, Circuits, Hamilton graph, Matrix representation. Application Problems	08	CO1
2	**Complex Variable** Basic definitions**,** Elementary function, Analytic function, Cauchy-Riemann equations in Cartesian and polar coordinates , Analyticity of given function, Harmonic function , Construction of analytic functions (with application problem), Milne-Thompson method. Application Problems	08	CO2
3	**Probability Distributions** Types of variables, Probability mass & density function, Expectation or Mean & variance of random and continuous variable, Probability Distribution**:** Geometric distribution, Poisson distribution & Poisson or Random processes,	08	CO3
4	**Sampling Distribution** Sampling, sampling distribution, central limit theorem, Sampling with & without replacement, Confidence limits for means, Student's t distribution, Chi- Square distribution as a test of goodness of fit. Application Problems	08	CO4
5	**Joint Probability Distribution & Markov Chains** Concept of joint probability, joint probability distribution, Expectation, variance, covariance and correlation, Stochastic or random processes, Transition and Regular stochastic matrix, Markov chain, Transition probabilities matrix, Higher transition probabilities. Application Problems	08	CO5 CO6

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.

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. Gilbert Strang, Linear Algebra and its Applications, 4th edition, *Cengage Publishers*, 2014, ISBN: 9788131501726.

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.
4. Schaum's Outline: Introduction to Probability and Statistics, *McGraw Hill Education* (*India*) *Private Limited* (1 September 2005); ISBN-13: 978-0070605015.
5. David C Lay, "Linear Algebra and Application", *Pearson Education*, ISBN-9788177583335

Scheme of Evaluation of the CIE & Assessment Pattern :

Assignment : Only one assignment (open book test normally) will be of 10 marks & conducted in the class during the course of the semester (normally midway thro' the semester or in between 2nd & 3rd test). Generally, 2- 4 questions can be given which has to be solved in 1 hour duration, the assignment question has to be from the self-study component or it can be a coding demo done in the laptop & shown on the spot to the teacher in the class, the questions has to be set according to easy, medium, tough & severe.

Quiz : There will be 1 quiz of 30 questions of 1 marks each, which will be reduced to 10 marks, which may be conducted along with the 2nd CIE test or at the appropriate time during the course of the semester as per the calendar of events.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set model-wise.

CIE – Continuous Internal Evaluation Theory (50 Marks)

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

SEE – Semester End Examination Theory (50 Marks)

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

SIGNALS & SYSTEMS

Course Code : 18EC4DCSAS | **Credits :** 04
L : P : T : S : 4 : 0 : 1 : 0 | **CIE Marks :** 50
Exam Hours : 03 | **SEE Marks :** 50
Total Hours : 50 | **CIE + SEE Marks :** 100

COURSE OBJECTIVES:

1. To give the basic introduction to the mathematical analysis of signals and systems.
2. To represent input- output relationships for Linear Time Invariant systems.
3. To understand Fourier and Z-Transforms and their interrelationships.
4. To analyse time-domain and frequency domain approaches for continuous and discrete systems.
5. To apply the Fourier representation on periodic and non-periodic signals
6. To examine about the sampling process

COURSE OUTCOMES:

After completion of the course, the graduates will be able to

CO1	Categorize and perform basic operations on signals and systems.
CO2	Apply the knowledge of system properties to Investigate signal behaviour in time and frequency domain.
CO3	Analyze different time and frequency domain representations for LTI systems.
CO4	Analyze signals in frequency domain using Fourier representation.
CO5	Illustrate the importance of sampling theorem, Nyquist rate and reconstruction of CT Signals.
CO6	Examine concepts of signals and systems using simulation tool.

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	1	1	-	-	-	-	-	-	-	-
CO3	3	3	2	1	-	-	-	-	-	-	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-	-
CO5	3	2	1	1	-	-	-	-	-	-	-	-
CO6	-	1	1	1	1	-	-	-	-	-	-	-

Module	Course Content	Hours	COs
1	**Introduction:** Definitions of a signal and system, Classification of signals: CT & DT, Even & Odd, Periodic & Non-periodic, Deterministic and Random, Energy & Power, Elementary signals: Impulse, Step, Ramp, Exponential and Sinusoidal. Basic Operations on signals: Operation performed on dependent and independent variables.	10	CO1
2	**System:** Properties of systems: Memory, Causality, Linearity, Time Invariance, Stability and Inevitability. **Time-domain representations for LTI systems:** Introduction, Convolution Sum and Evaluation Procedure, The Convolution Integral, Evaluation Procedure. Impulse Function and its properties. Properties of impulse response representation for LTI systems.	10	CO2 CO3
3	**Time-domain representations for LTI systems**: Differential and Difference Equation Representations of LTI Systems, Solving difference equation. **Z-Transforms: (***Brief review of Z-Transforms) properties of ROC, properties of Z-transforms, Inversion of the z-Transforms, the Transfer function, system response, Causality and Stability of system.	10	CO3
4	**Fourier representation for signals:** Introduction, Fourier series and Fourier transform and their properties, Discrete time Fourier series and Fourier transforms and their properties (derivation for transforms and properties excluded). Problems.	10	CO3 CO4
5	**Applications of Fourier representations** [Qualitative analysis]**:** Introduction, Relation between FT and FS, DTFS, DTFT, Convolution and Modulation with mixed signal classes. Sampling: Sampling CT Signals, Reconstruction of continuous time signals from samples: Sampling Theorem. Frequency domain sampling and Discrete Fourier Transform (DFT). Computation of N-DFT using basic expression.	10	CO4 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 : Systems viewed as Interconnections of operations. Exploring concepts with MATLAB.

UNIT 2 : Block diagram representations. Exploring concepts with MATLAB.

UNIT 2 : Unilateral Z - Transforms. Finding system response using Unilateral Z-Transformation. Exploring concepts with MATLAB.

UNIT 4 : Derivation for Fourier representations.

UNIT 5 : Sub sampling: Sampling DT Signals, Ideal Reconstruction.

TEXT BOOKS

1. Simon Haykin, "Signals and Systems", *John Wiley India Pvt. Ltd*., 2nd Edn, 2008.
2. H. P Hsu, R. Ranjan, Scham's outlines of "Signals and Systems", *TMH*, 2006.

REFERENCE BOOKS

1. Michael Roberts, "Fundamentals of Signals & Systems", 2nd Edition, *Tata McGraw Hill*, 2010.
2. Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab, "Signals and Systems", *Pearson Education Asia / PHI*, 2nd Edition, 1997, Indian Reprint 2002.
3. B. P. Lathi, "Linear Systems and Signals", *Oxford University Press*, 2005.
4. Vinay K. Ingle and John G. Proakis, "Digital Signal Processing Using MATLAB", *Cengage Learning*, Third Edition, 2012.

Scheme of Evaluation of the CIE & Assessment Pattern :

Assignment : Only one assignment (open book test normally) will be of 10 marks & conducted in the class during the course of the semester (normally midway thro' the semester or in between 2nd & 3rd test). Generally, 2- 4 questions can be given which has to be solved in 1 hour duration, the assignment question has to be from the self-study component or it can be a coding demo done in the laptop & shown on the spot to the teacher in the class, the questions has to be set according to easy, medium, tough & severe.

Quiz : There will be 1 quiz of 30 questions of 1 marks each, which will be reduced to 10 marks, which may be conducted along with the 2nd CIE test or at the appropriate time during the course of the semester as per the calendar of events.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set model-wise.

CIE – Continuous Internal Evaluation Theory (50 Marks)

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

SEE – Semester End Examination Theory (50 Marks)

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

COMMUNICATION THEORY

Course Code : 18EC4DCOT | **Credits :** 03
L : P : T : S : 3 : 0 : 0 : 0 | **CIE Marks :** 50
Exam Hours : 03 | **SEE Marks :** 50
Total Hours : 40 | **CIE + SEE :** 100

COURSE OBJECTIVES:

1. To learn the concepts of analog and digital communication
2. To provide the concepts of Electronic communication methods.
3. To understand various conventional modulation and demodulating techniques used for efficient communication.
4. Analyze the performance of waveform coding techniques
5. Understand the concepts in Angle modulation and design simple systems for generating and demodulating frequency modulated signals
6. Evaluate the performance of the communication system in presence of noise.

COURSE OUTCOMES:

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

CO1	Apply the knowledge of sampling and analyze pulse modulation techniques
CO2	Illustrate AM and FM modulation techniques in time domain and frequency domain
CO3	Analyze different techniques of generation and detection of AM and FM signals
CO4	Analyze the effects of noise on analog communication systems
CO5	Compute analog modulated wave form in time / frequency domain, evaluation of modulation index & to calculate bandwidth and power requirements for analog systems
CO6	Analyze different waveform coding techniques

Mapping of Course Outcomes to Program Outcomes:

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

Module	Course Content	Hours	COs
1	**Amplitude modulation:** Elements of communication system, AM modulation techniques: DSBFC Time and frequency domain description, modulation index, Spectral analysis, Generation of AM using square law modulator, Detection of AM using Envelope Detector. DSBSC Time and frequency domain description, Generation of DSBSC using Balanced Modulator, Coherent detection of DSBSC, SSBSC with frequency domain description, VSB with frequency domain description, Frequency translation, FDM (Book 1)	8	
2	**Angle modulation:** Basic concepts, Relationship between FM and PM .Single tone FM, Spectral analysis of Sinusoidal FM, Types of FM: NBFM and WBFM, Transmission bandwidth of FM waves, Generation of FM: Indirect FM and Direct FM, Zero crossing detector (Book 1)	8	
3	**Noise Characterization:** Introduction, shot noise, thermal noise, white noise, Noise equivalent bandwidth, Narrow band noise, Noise Figure, Equivalent noise temperature, cascade connection of two-port networks. Figure of merit for AM[DSBSC], Threshold effect, Figure of merit for FM, Threshold effect, Pre and de-emphasis for FM (Book 1)	8	
4	**Sampling process and Pulse Modulation techniques**: Advantages of digital transmission, Analog to Digital Converter block diagram., Sampling Theorem, Reconstruction of message from its sample, Signal distortion in sampling, Practical aspects of sampling and signal recovery, PAM-PWM-PPM: modulator and demodulator circuit (Book 3 and book 2)	8	
5	**Waveform Coding Techniques**: Pulse Code Modulation, sampling, quantization, Companding, Digital formats to represent the digital signals, Differential Pulse Code Modulation, Delta Modulation, Time Division Multiplexing, Digital Multiplexers : T1/E1 system (Book 1 and Book 2)	8	

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 : Super-heterodyne receiver, related simulations.
UNIT 2 : Synchronization aspects-Costas loop, FM stereo multiplexing
UNIT 3 : Pre-envelope concept, Canonical representation of band passes signals-derivation.
UNIT 4 : Quadrature sampling of band pass signals
UNIT 5 : Adaptive digital coding

TEXT BOOKS:

1. Simon Haykins, "An Introduction to Analog and Digital Communication", *John Wiley India Pvt. Ltd*., 2008
2. Simon Haykins, " Digital Communications", *John Wiley India Pvt. Ltd*., 2008
3. Singh and Sapre, "Communication Systems- Analog and Digital", *TMH* 2nd Edition, 2007.

REFERENCE BOOKS:

1. B.P. Lathi, "Modern digital and analog Communication systems", *Oxford University Press*, 4th Edn, 2010.
2. K. Sam Shanmugam, "Digital and Analog Communication systems", *Wiley Publication*, 1985.
3. J.E. Flood, "Telecommunications switching traffic and networks", Pearson publication, 2004

Scheme of Evaluation of the CIE & Assessment Pattern :

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Quiz : There will be 1 quiz of 30 questions of 1 marks each, which will be reduced to 10 marks, which may be conducted along with the 2nd CIE test or at the appropriate time during the course of the semester as per the calendar of events.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set model-wise.

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	05		03
Analyze	05	05	03
Evaluate			
Create			

SEE – Semester End Examination Theory (50 Marks)

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

LINEAR INTEGRATED CIRCUITS & APPLICATIONS

Course Code : 18EC4DCLIC | **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. Define and describe various parameters of op-amp, its characteristics and specifications.
2. Apply the knowledge of op-amp to design DC amplifiers and AC Amplifiers.
3. Describe and sketch the various non-linear circuits of op-amp and analyze its operations.
4. Sketch and analyze different applications of timer NE555 and types of DACs and ADCs.
5. Analyze different linear applications of Op-amp.

COURSE OUTCOMES:

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

CO1	Apply knowledge of electronic circuit to analyze op-amp parameters.
CO2	Design and sketch op-amp DC and AC amplifiers.
CO3	Design and analyze various non-linear op-amp circuits and signal processing circuits.
CO4	Analyze linear op-amp circuit applications using function specific Timer IC.
CO5	Design first and second order low pass filter, high pass filter, Band pass filter.
CO6	Develop various A/D and D/A converter circuits and regulator circuits using op-amp.

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	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-
CO6	3	2	2	-	-	-	-	-	-	-	-	-

Module	Course Content	Hours	COs
1	**Operational Amplifier Fundamentals:** Basic op-amp circuit, op-amp parameters – input and output voltage, CMRR and PSRR, offset voltages and currents, Slew rate, input and output impedances. **Op-amp as DC Amplifiers:** Biasing of op-amps, Direct coupled –voltage follower, Direct coupled Non-inverting amplifier, Direct coupled inverting amplifier.	08	CO1 CO2
2	**Op-amp as AC Amplifiers:** Capacitor coupled voltage follower, High input impedance capacitor coupled voltage follower, Capacitor coupled Non-inverting amplifier, High input impedance - capacitor coupled Non-inverting amplifier, Capacitor coupled inverting amplifiers, Capacitor coupled Difference amplifier, setting the upper cut-off frequency.	08	CO2
3	**Op-amp Non-linear circuits:** Crossing detectors, inverting schmitt trigger circuit, Monostable multivibrator and Astable multivibrator. **Signal processing circuits**: Precision rectifiers, limiting circuits, sample and hold circuit, Clamping circuits and Peak detector.	08	CO3
4	**Linear IC applications:** Basic 555 timer circuit, 555 timer used as Astable Multivibrator and Monostable Multivibrator, PLL, voltage controlled oscillator. **Active Filters** –First order and second order Low pass filter, First order and second order High pass filters, Band Pass Filter : Multistage, single stage first order, wideband and narrow band filters.	08	CO4 CO5
5	**Data converters:** DAC/ADC specifications, weighted resistor DAC, R-2R ladder DAC, A/D converters- Flash type ADC, counter type ADC, Servo tracking ADC, Successive approximation ADC. **Voltage regulators**: Series op-amp regulator, IC voltage regulators (78xx/79xx) and IC723 adjustable voltage regulator.	08	CO6

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 : Analysis of data sheets of μA741 op-amp, summing amplifiers, Integrator, Differentiator,
Unit-2 : Bandwidth, Slew rate effects, Op-amp frequency response and compensation, Circuit stability.
Unit-3 : V to I and I to V converters, Multiplier and divider, Log and Antilog using op amp
Unit-4 : Phase detector / comparator, Band stop filter.
Unit-5 : Switching regulators (SMPS), dual slope ADC.

TEXT BOOKS:

1. David A. Bell, "Operational Amplifiers and Linear IC's", 2nd edition, *PHI/Pearson*, 2004.
2. D. Roy Choudhury and Shail B. Jain, "Linear Integrated Circuits", 2nd edition, Reprint 2006, *New Age International*.
3. David A. Bell, "Operational Amplifiers and Linear IC's", 3rd edition, *PHI/Oxford*.

REFERENCE BOOKS:

1. Robert. F. Coughlin & Fred. F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", *PHI/Pearson*, 2006.
2. George Clayton and Steve Winder, "Operational Amplifiers", *Elsevier* 5th ed., 2008.
3. Ramakant A. Gayakwad, "Op-Amps and linear integrated circuits", *PHI*, 4e
4. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", *TMH*, 3 edn., 2005.

Scheme of Evaluation of the CIE & Assessment Pattern :

Assignment : Only one assignment (open book test normally) will be of 10 marks & conducted in the class during the course of the semester (normally midway thro' the semester or in between 2nd & 3rd test). Generally, 2- 4 questions can be given which has to be solved in 1 hour duration, the assignment question has to be from the self-study component or it can be a coding demo done in the laptop & shown on the spot to the teacher in the class, the questions has to be set according to easy, medium, tough & severe.

Quiz : There will be 1 quiz of 30 questions of 1 marks each, which will be reduced to 10 marks, which may be conducted along with the 2nd CIE test or at the appropriate time during the course of the semester as per the calendar of events.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set model-wise.

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	05		02
Apply	05	05	02
Analyze	10	05	02
Evaluate			02
Create			

SEE –Semester End Examination Theory (50 Marks)

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

MICROCONTROLLERS

Course Code : 18EC4DCMIC | **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 give comprehensive coverage of theoretical and programming concepts.
2. To discuss about the fundamentals of 8051 and ARM with architecture and memory organization.
3. To impart knowledge on different instruction sets and addressing modes, that deals with methods of accessing memory using instructions.
4. To provide exposure to assembly language and insight about timers and its operation along with programming concepts using both C and assembly language.
5. To disseminate knowledge on serial communication, interrupts and its programming.
6. To enhance overall programming skills to develop interfaces Programs of 8051.

COURSE OUTCOMES:

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

CO1	**Use** the knowledge of memory architecture, instruction set to categorize the controllers**.**
CO2	**Analyze** the fundamental concepts of 8051 and ARM.
CO3	**Apply** the knowledge of instruction set and addressing modes to write assembly level coding.
CO4	**Use** the programming skills for coding software delay programs of 8051.
CO5	**Analyze** and code for serial communication, timers and interrupts of 8051.
CO6	**Develop 8051** on-chip peripheral programs for interfacing applications.

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	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-
CO6	3	2	1	1	-	-	-	-	-	-	-	-

Module	Course Content	Hours	COs
1	**Introduction:** Overview of microcomputer systems and their building blocks, Difference between Microprocessors and Microcontrollers, RISC & CISC Architectures, Harvard & Von-Neumann memory organizations. **8051 microcontroller:** Pin diagram, Architecture, memory organization including stack mechanism. **Text Book-1,2**	08	CO1 CO2
2	**8051 instruction Set:** Addressing modes -Immediate, direct, Indirect, Register, Indexed .Data transfer instructions, arithmetic and logical instructions, Bit manipulation, Jump and call instructions. Assembler directives. **Text Book-1**	08	CO3
3	**8051 Programming:** Assembly language programs, Software delay calculations, Software delay programming. **8051 Interrupts:** Introduction, programming external interrupts in assembly. **Text Book-1**	08	CO4 CO5
4	**8051 Timers and serial port:** Timer introduction, Different modes of timer operations, Assembly and C programming on Timers (Mode1 and Mode 2) . Basics of 8051 Serial Communication, RS 232 connections, C programming on serial communication **Text Book-1**	08	CO5
5	**8051 Interfacing applications:** Interfacing 8051 to DAC, LCD and stepper motor . **Text Book -1** **Introduction to ARM**: Architecture, data processing instructions (Move, Arithmetic, logical, comparison, Multiply), branch instructions, Load store instructions (Single register transfer). **Text Book-3**	08	CO2 CO6

NOTE:

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

SELF-STUDY COMPONENT:

UNIT 1 : Evolution of Microcontrollers.
UNIT 2 : Addressing Modes related to CALL, JUMP and Bit Addressable Instructions.
UNIT 3 : Introduction to Embedded C.
UNIT 4 : 8051 counters.
UNIT 5 : ARM-Pin diagram, Load store instructions (multiple register transfer)

TEXT BOOKS:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay, "The 8051 Microcontroller and Embedded Systems – using assembly and C ", *PHI*, 2006
2. Kenneth J. Ayala, "The 8051 Microcontroller", *Penram International Publishing*, 1996.
3. Andrew N Sloss, Dominic Symes, Chris Wright, "ARM systems Developer's Guide " Elsever Publication, 2004

REFERENCE BOOKS:

1. Narendra Kumar &HemanthKumar C.S., "Microcontrollers 8051 and MSP 430", *Excellent Engineer Publications*.
2. D.A. Patterson and J.H. Hennessy, "Computer Organization and Design -The hardware and software interface", *Morgan Kaufman Publishers*.
3. V. Udayshankara and M.S. Mallikarjuna Swamy, "8051 Microcontroller".

Scheme of Evaluation of the CIE & Assessment Pattern :

Assignment : Only one assignment (open book test normally) will be of 10 marks & conducted in the class during the course of the semester (normally midway thro' the semester or in between 2nd & 3rd test). Generally, 2- 4 questions can be given which has to be solved in 1 hour duration, the assignment question has to be from the self-study component or it can be a coding demo done in the laptop & shown on the spot to the teacher in the class, the questions has to be set according to easy, medium, tough & severe.

Quiz : There will be 1 quiz of 30 questions of 1 marks each, which will be reduced to 10 marks, which may be conducted along with the 2nd CIE test or at the appropriate time during the course of the semester as per the calendar of events.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set model-wise.

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	05		02
Apply	05	05	02
Analyze	10	05	02
Evaluate			02
Create			

SEE –Semester End Examination Theory (50 Marks)

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

CONTROL SYSTEM ENGINEERING

Course Code : 18EC4DCCSE
L : P : T : S : 3 : 0 : 0 : 0
Exam Hours : 03
Total Hours : 40

Credits : 03
CIE Marks : 50
SEE Marks : 50
CIE + SEE : 100

Course Objectives:

1. Understand the basic features of and application of control systems.
2. Learn how to find mathematical model of Mechanical, electrical and electro mechanical system.
3. To introduce the time & frequency response concepts in the design of control systems.
4. Stability analysis of control systems in time domain & frequency domain using plots.
5. To introduce the design of control systems using state space approach

Course Outcomes:

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

CO1	Model Mathematically for Mechanical, Electrical and Electromechanical systems using differential equations.
CO2	Evaluate the Block diagram system and representation of Signal Flow Graph
CO3	Find the Electrical Modeling of a Second order system for unit step input and analyze the under damped, over damped and critical damped cases.
CO4	Demonstrate and Analyze the stability of Linear feedback controls system using RH criteria and Root locus
CO5	Synthesize and Analyze several type of feedback control system by drawing frequency response using Bode plot Technique
CO6	Express and Evaluate System equation in State Variable (State Variable Model)

Mapping of Course outcomes to Program outcomes:

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

Module	Contents of the Module	Hours	COs
1	**Introduction to control systems:** Classifications of Control Systems, Open loop v/s Closed loop Systems with Examples. **Mathematical Modeling of linear systems**: Mechanical Systems, Electrical systems, Analogous system based on F-V and F-I analogy. (Translational and Rotational Systems).	8	CO1
2	**Block diagrams and Signal Flow Graph:** Block diagram, Signal Flow graph (excluding gear trains, lever).	8	CO2
3	**Time response of Feedback Control System**: Standard Test signals, Steady state error and error constants. Unit step Response of first order and second order systems, response specifications of 2^{nd} order systems.	8	CO3
4	**Stability analysis:** Necessary conditions for stability, RH criterion, applications of RH criterion with limitations. **Root locus Techniques**: Introduction to root locus concepts, Construction rules, Analysis of stability by root locus plot.	8	CO4
5	**Frequency Response Analysis**: Bode plots, Relative stability, and Frequency domain specification. **State variable analysis:** introduction to state variable analysis, Concepts of state, state variables and state models for electrical systems. Solution of state equations. State transition matrix and its properties.	8	CO5 CO6

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.

Pre-requisites:

Network Analysis, Electric Circuits, Signals & Systems, Signal Processing, Engineering Mathematics-I/II/III/IV

Self Study Component:

Unit-1 : Review of Laplace Transforms, transfer function, Servomotors (AC & DC), Stepper motors, modeling of DC motors.
Unit-2 : Introduction to PI, PD & PID Controllers.
Unit-3 : Inverse root locus plots.
Unit-4 : Introduction to polar plots,Nyquist stability criteria. Compensation techniques.
Unit-5 : State model for linear continuous and discreet time system.

Text Books:

1. J. Nagrath& M. Gopal, "control systems engineering", 5th Edition - 2005, *New Age International Publishers*, New Delhi, India.
2. Katsuhiko Ogata, "Modern Control Engineering", 4th Edition - 2002, *PHI*, New Delhi, India.
3. Benjamin Kuo, Farid Golnaraghi, "Automatic Control Systems", 8th Edition, *John Wiley & Sons*, USA, 2008.

Reference Books:

1. Richard C Dorf, Robert H. Bishop, "Modern Control Systems", 12th Edition, *PHI-Imprint of Pearson*, USA.
2. Joseph Cyril Babu & S P Xavier Eugene, "Principles of Control System", 1st Edition, *Schand Publishers*, New Delhi, India.
3. DiStefano III, Stubberud, Williams, "Feedback and Control Systems", TMH, 2nd Edition 2007.

Scheme of Evaluation of the CIE & Assessment Pattern :

Assignment : Only one assignment (open book test normally) will be of 10 marks & conducted in the class during the course of the semester (normally midway thro' the semester or in between 2nd & 3rd test). Generally, 2- 4 questions can be given which has to be solved in 1 hour duration, the assignment question has to be from the self-study component or it can be a coding demo done in the laptop & shown on the spot to the teacher in the class, the questions has to be set according to easy, medium, tough & severe.

Quiz : There will be 1 quiz of 30 questions of 1 marks each, which will be reduced to 10 marks, which may be conducted along with the 2nd CIE test or at the appropriate time during the course of the semester as per the calendar of events.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set model-wise.

CIE – Continuous Internal Evaluation Theory (50 Marks)

Bloom's Category	**Tests - 3 CIEs**	**Assignments - 1 No.**	**Quiz - 1 No.**
Marks (Out of 50)	30	10	05
Remember	10		01
Understand	10	04	01
Apply			
Analyze	05	03	02
Evaluate	05	03	01
Create			

SEE – Semester End Examination Theory (50 Marks) :

Bloom's Category	**Theory Marks (50)**
Remember	05
Understand	15
Apply	15
Analyze	10
Evaluate	-
Create	05

ANALOG COMMUNICATION AND LINEAR INTERGRATED CIRCUITS LAB

Course Code : 18EC4DLMCL **Credits :** 02
L : P : T : S : 3 : 0 : 1 : 0 (2 credits) **CIE Marks :** 50
Exam Hours : 03 **SEE Marks :** 50
Total Hours : 26 **CIE + SEE Marks** : 100

COURSE OBJECTIVES:

1. To understand and design active second order Butterworth high pass and low pass filters.
2. To design and study the operation of Schmitt trigger, R-2R DAC using op-amp.
3. To design and analyze multivibrators using 555 Timers.
4. To Design and analyze Precision Rectifiers using op-amp.
5. To understand the concepts of different analog modulation techniques.
6. To analyze analog systems for FM operations.

COURSE OUTCOMES:

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

CO1	Design filters for different cut-off frequencies.
CO2	Model precision rectifiers using Op-Amps.
CO3	Design Op-Amp Schmitt Trigger for a given specification.
CO4	Design & test the performance of multivibrators for specified pulse width / duty cycle
CO5	Apply the knowledge of network circuits to convert the signals from digital to analog.
CO6	Analyze different analog & pulse modulation techniques.

Mapping of Course Outcomes to Program Outcomes:

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

Expt. No.	Experiment details	Hours	COs
	Hardware Experiments		
1	Second order active LPF and HPF	02	CO1
2	Second order active BPF and BEF	02	CO1
3	Schmitt Trigger Design and test a Schmitt trigger circuit for the given values of UTP and LTP	02	CO3
4	Design and test R-2R DAC using op-amp	02	CO5
5	Design and test the following circuits using IC 555 a. Astable Multivibrator for given frequency and duty cycle b. Monostable Multivibrator for given pulse width *W*.	02	CO4
6	Pulse Amplitude Modulation and Detection	02	CO6
7	Pulse Width Modulation and Pulse Position Modulation	02	CO6
8	Precision rectifiers – both Full Wave and Half Wave	02	CO2
9	Amplitude modulation using transistor (Generation and detection)	02	CO6
	Software Experiments **Simulation with Multisym and MATLAB**		
1	Amplitude modulation using transistor (Generation and detection)	02	CO6
2	Frequency modulation using 8038/2206	02	CO6
3	Second order active BPF and BEF	02	CO1
4	Design and test the Monostable Multivibrator for given pulse width W using IC 555	02	CO4
5	Schmitt Trigger Design and test a Schmitt trigger circuit for the given values of UTP and LTP	02	CO3
6	Design and test R-2R DAC using op-amp	02	CO5
7	Pulse Width Modulation and Pulse Position Modulation	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 Practicals (50)
Remember	-
Understand	5
Apply	15
Analyze	10
Evaluate	10
Create	10

MICROCONTROLLER LAB

Course Code : 18EC4DLMIC **Credits :** 02
L: P: T: S : 3 : 0 : 1 : 0 **CIE Marks :** 50
Exam Hours : 03 **SEE Marks :** 50
Total Hours : 26 **CIE + SEE Marks** : 100

COURSE OBJECTIVES

1. To provide knowledge on fundamental concepts of 8051 and ARM.
2. To provide understanding of assembly language programming concepts and improve the programming skill.
3. To familiarize students with Kiel software.
4. To familiarize students with different sets of instructions available for programming.
5. To give exposure on interfacing concepts using C language with different peripherals.
6. To provide foundation for developing 8051 based applications.

COURSE OUTCOMES :

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

CO1	Employ the knowledge of 8051 and ARM architecture & memory organization for developing assembly language programs using KEIL software.
CO2	Apply assembly language programming skills to build ALPs for arithmetic & logic operations.
CO3	Analyze & code for timers, serial communications & interrupts.
CO4	Use hardware kit and various peripherals to analyze hardware interfacing.
CO5	Apply embedded C programming skills to develop programs for hardware interfacing.
CO6	Demonstrate simulated hardware programs on 8051 kit interfaced with various peripherals.

Mapping of Course Outcomes to Program Outcomes:

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

Cycle	Expt. No.	List of Experiments	Hours	CO's
1		**ALP simulation programs on 8051**	12	CO1 CO2 CO3
	1	Data Transfer Programs - 8051 a. Block data transfer without overlap b. Block exchange.		
	2	Arithmetic operation -8051: a. Addition, subtraction, multiplication and division of two 8 bit numbers. b. Bubble Sorting algorithm.		
	3	Bit manipulation, Boolean & Logical Instructions programs: - 8051 a. To perform logical operation on two 8 bit numbers.		
	4	b. Conditional bitwise logical operations. Counters -8051: a. BCD counter using software delay b. Hex counter using timer delay of 1 sec.		
	5	Conversion: 8051 a. HEX– Decimal b. Decimal – HEX		
	6	Serial data transmission with variable baud rate-8051		
	7	ARM: a. Write an ALP to implement Data transfer operations. b. Write an ALP to implement Arithmetic operations.		
2		**Programs to interface 8051 chip to Interfacing modules**	10	CO4 CO5 CO6
	1	Implementation of DAC 0808 interface to 8051 to generate square, triangular, ramp waveforms.		
	2	Stepper motor interface to 8051.		
	3	DC motor interface to 8051.		
	4	Alphanumeric LCD panel interface to 8051.		
	5	Elevator interface to 8051.		

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 Practicals (50)**
Remember	-
Understand	5
Apply	15
Analyze	10
Evaluate	10
Create	10

Constitution of India & Professional Ethics (CIPE)

Course Code : 18HS4ICCIP | **Credits :** 01
L : P : T : S : 1 : 0 : 0 : 0 | **CIE Marks :** 50
Exam Hours : 00 | **SEE Marks :** 00
Total Hours : 14 | **CIE + SEE Marks :** 50

Course Objectives:

1. To assimilate and to have overall legal literacy to appear competitive examinations.
2. To identify the individual role to face the legal problems.
3. To understand ethical and social responsibility towards society.

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

CO1	Have legal knowledge with confidence to clear various competitive examinations.
CO2	Understand the policies of central and state for present scenario.
CO3	Understand ethics to become responsible and good citizens of the country.

Mapping of Course outcomes to Program outcomes:

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

Module	Course content	Hours	COs
1	**MODULE-I** • Introduction to the Constitution. Making and role of the Constituent Assembly. Preamble and salient features of Constitution. • Fundamental rights. Limitations and restrictions. • Directive Principles of State Policy and its relevance. • Fundamental duties, scope and significance.	3	CO1
2	**MODULE-II** • Parliamentary Democracy. Lok Sabha & Rajya Sabha. Federal System. • Union Executive- President, Vice President, Prime Minister, Council of Ministers. • Supreme Court, Judicial Review and Judicial Activism. • State Legislature- Legislative Assembly and Legislative Council. • State Executive- Governor, Chief Minister, Council of Ministers. High Court.	3	CO1 CO2
3	**MODULE-III** • Election Commission and Electoral process.	3	CO1

	• Amendments and its procedures. Important amendments (7,9,10,12,42,44,61,73,74,75,86,91,94,95,100,101,118) & judicial verdicts. • Emergency provisions and types.		
4	**MODULE-IV** • Special provisions to SC, ST, OBC and women and children under Indian Constitution. • Municipalities, Panchayats and Co-operative Societies. • Human Rights. National Human Rights Commission and Protection of Human Rights Act 1993 and 2006 amendment.	2	CO1 CO2
5	**MODULE-V** • Professional Ethics- Scope and aim of engineering Ethics. • Responsibilities- impediments to responsibility. • Risk, safety and liability of engineers. Conflict of interest. • Intellectual Property Rights, patents, trade mark, trade secrets and copy right.	3	CO1 CO3

Text books:

1. Durga Das Basu- "Introduction to the Constitution of India" Latest edition.

Reference books:

1. M.V. Pylee "An Introduction to Constitution of India", Vikas Publication 2002.
2. Latest Publications of NHRC- Indian Institute of Human Rights, New Delhi.

Scheme of Evaluation of the CIE & Assessment Pattern :

Assignment : Only one assignment (open book test normally) will be of 10 marks & conducted in the class during the course of the semester (normally midway thro' the semester or in between 2nd & 3rd test). Generally, 2- 4 questions can be given which has to be solved in 1 hour duration, the assignment question has to be from the self-study component or it can be a coding demo done in the laptop & shown on the spot to the teacher in the class, the questions has to be set according to easy, medium, tough & severe.

Quiz : There will be 1 quiz of 30 questions of 1 marks each, which will be reduced to 10 marks, which may be conducted along with the 2nd CIE test or at the appropriate time during the course of the semester as per the calendar of events.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set model-wise.

CIE – Continuous Internal Evaluation

Bloom's Category	**Tests**	**Assignment**	**Quiz**
Marks	**30**	**10**	**10**
Remember	20	10	10
Understand	10		
Apply			

Scheme of evaluation

CIE (50 marks)				
	Internal Assessment Test	Marks		
		Test marks out of 30	Total final CIE marks	Final CIE Marks
CIE	Test (only 1 test during third internals)	30 marks max.	30 + 10 (Only 1 Assignment) + 10 (Quiz) = 50 marks	50 marks Max.

KANNADA MANASU (Only for Karnataka students)

Course Code : 18HS4ICKAM
L : P : T : S : 1 : 0 : 0 : 0
Exam Hours : 00
Total Hours : 14

Credits : 01
CIE Marks : 50
SEE Marks : 00
CIE + SEE Marks : 50

Course Objectives:

1. To initiate the importance of the Kannada Literary works.
2. To introduce the rich and cultural heritage of Karnataka.
3. To gain knowledge of a novel language and use it effectively.

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

CO1	Make use of Kannada words in regular context.
CO2	Identify Karnataka as a source of rich culture and heritage.
CO3	Recognize the importance of Kannada poets and writers.

Mapping of Course outcomes to Program outcomes:

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

Course content	Hours	COs
1. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ 2. ವಿವಿಧ ರೀತಿಯ ಅರ್ಜಿ ನಮೂನೆಗಳು 3. ಪತ್ರ ವ್ಯವಹಾರ – ಸರ್ಕಾರಿ ಅರೆಸರ್ಕಾರಿ ಪತ್ರಗಳು – ಆಹ್ವಾನ ಪತ್ರಿಕೆ, ಜಾಹೀರಾತು, ಪತ್ರಿಕಾ ಪ್ರಕಟಣೆ ಇತ್ಯಾದಿ ಪತ್ರಗಳು 4. ಭಾಷೆ ಮತ್ತು ಬರಹ – ಡಾ. ಏಂ ಚಿದಾನಂದ ಮೂರ್ತಿ ರವರ ಭಾಷಾ ವಿಜ್ಞಾನದ ಮೂಲ ತತ್ವಗಳು ಪುಸ್ತಕದಿಂದ 5. ಭಾಷಾಭ್ಯಾಸ – ತತ್ಸಮ ತದ್ಭವ, ಸಮಾನಾರ್ಥಕ ಪದಗಳು, ವಿರುದ್ಧಾರ್ಥಕ ಪದಗಳು, ನಾನಾರ್ಥ ಪದಗಳು, ನುಡಿಗಟ್ಟುಗಳು, ಅನುಕರಣಾವ್ಯಯಗಳು (ದ್ವಿರುಕ್ತಿ) ಮತ್ತು ಜೋಡು ನುಡಿಗಳು, ಕನ್ನಡದ ದೇಶ್ಯ ಪದಗಳು, ಅನ್ಯದೇಶ್ಯ ಪದಗಳು. 6. ಭಾಷಾ ರಚನೆ – ವಾಕ್ಯ ಪದ್ಧತಿ ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳು, ಪತ್ರ ಲೇಖನ, ವರದಿ ಲೇಖನ, ಪ್ರಬಂಧ ಲೇಖನ. 7. ಶ್ರಾವಣ (ಕವನ) – ದ ರಾ ಬೇಂದ್ರೆ 8. ಡಾ. ವಿಶ್ವೇಶ್ವರಯ್ಯ – ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ (ವ್ಯಕ್ತಿ ಚಿತ್ರ) – ಏ ಏನ್ ಮೂರ್ತಿರಾವ್ 9. ದೋಣಿ ಹರಿಗೋಲುಗಳಲ್ಲಿ (ಪ್ರವಾಸ ಕಥನ) – ಶಿವರಾಮ ಕಾರಂತ 10. ಅಣ್ಣಪ್ಪನ ರೇಷ್ಮೆ ಕಾಯಿಲೆ (ಪ್ರಬಂಧ) – ಕುವೆಂಪು 11. ನಮ್ಮ ಏಮ್ಮೆಗೆ ಮಾತು ತಿಳಿಯುವುದೆ? (ವಿನೋದ) – ಗೊರೂರು ರಾಮಸ್ವಾಮಿ ಅಯ್ಯಂಗಾರ್ 12. ಆನೆಹಳ್ಳದಲ್ಲಿ ಹುಡುಗಿಯರು (ವಿಜ್ಞಾನ ಲೇಖನ) – ಬಿ ಜಿ ಏಲ್ ಸ್ವಾಮಿ 13. ಬೆಡ್ ನಂಬರ್ ಏಳು (ಕತೆ) – ತ್ರಿವೇಣಿ 14. ರೊಟ್ಟಿ ಮತ್ತು ಕೋವಿ (ಕವನ) – ಸು ರಂ ಏಕ್ಕುಂಡಿ 15. ಗುಬ್ಬಚ್ಚಿಯ ಗೂಡು (ಅಂಕಣ ಬರಹ) – ಪಿ ಲಂಕೇಶ್	14	CO1 CO2 CO3

Text books:

1. H.K Lakkappa Gowda, Sahithya : Bahumuka Chinthane, *IBH Prakashana*.
2. Vivek Rai , Kannada Nudinadeya Barahagulu, *Sapna Books.*

Reference books:

1. K.V. Narayana, kannada Adunudiya Sollarimi, *Pragathi Publishers*.
2. Rahamath Tharikeri, Maradolagana Kichchu, *Abhinava Publishers*.

Scheme of Evaluation of the CIE & Assessment Pattern :

Assignment : Only one assignment (open book test normally) will be of 10 marks & conducted in the class during the course of the semester (normally midway thro' the semester or in between 2nd & 3rd test). Generally, 2- 4 questions can be given which has to be solved in 1 hour duration, the assignment question has to be from the self-study component or it can be a coding demo done in the laptop & shown on the spot to the teacher in the class, the questions has to be set according to easy, medium, tough & severe.

Quiz : There will be 1 quiz of 30 questions of 1 marks each, which will be reduced to 10 marks, which may be conducted along with the 2nd CIE test or at the appropriate time during the course of the semester as per the calendar of events.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set model-wise.

CIE – Continuous Internal Evaluation

Bloom's Category	**Test**	**Assignment**	**Quiz**
Marks	**30**	**10**	**10**
Remember	10	10	10
Understand	10	0	0
Apply	10	0	0

Scheme of evaluation

CIE (50 marks)				
CIE	Internal Assessment Test	Marks		
		Test marks out of 30	Total final CIE marks	Final CIE Marks
	Test (only 1 test during third internals)	30 marks max.	30 + 10 (Only 1 Assignment) + 10 (Quiz) = 50 marks	50 marks Max.

KANNADA KALI (Only for Non-Karnataka students)

Course Code : 18HS4ICKAK
L : P : T : S : 1 : 0 : 0 : 0
Exam Hours : 00
Total Hours : 14

Credits : 01
CIE Marks : 50
SEE Marks : 00
CIE + SEE Marks : 50

Course Objectives:

1. To express thoughts and ideas in the local language.
2. To utilize the vernacular language in a day to day life.
3. To establish an amicable relation with the localities.

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

CO1	Demonstrate effective communication skills with the local language.
CO2	Develop an association of well-being with the people of Karnataka.
CO3	Appraise the moral values and social behavior in Karnataka.

Mapping of Course outcomes to Program outcomes:

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

Course contents	Hours	COs
• Introducing each other – 1. Personal Pronouns, Possessive forms, Interrogative words. • Introducing each other – 2. Personal Pronouns, Possessive forms, Yes/No Type Interrogation: About Ramayana. Possessive forms of nons, dubitive question, Relative nouns • Enquiring about a room for rent. Qualitative and quantitative adjectives. • In a hotel Dative case defective Verbs. Vegetable market. Numeral, plurals. • Planning for a picnic. Imperative, Permissive, hortative. • Conversation between Doctor and the patient. Verb- iru, negation – illa, non past tense. • Doctors advise to Patient. Potential forms, no – past continuous. • Discussing about a film. Past tense, negation. • About Brindavan Garden. Past tense negation. • About routine activities of a student. Verbal Participle, reflexive form, negation. Telephone conversation. Past and present perfect past continuous and their negation Halebid, Belur. Relative participle, negation. • Discussing about examination and future plan. Simple conditional and negative. • Karnataka (Lesson for reading) • Kannada Bhaashe (Lesson for reading) • Mana taruva Sangati alla (Lesson for reading) • bEku bEDagaLu (lesson for reading)	14	CO1 CO2 CO3

Text books:

1. K V Narayana, Kannada Adunudiya Sollarime, *Pragathi Publishers*.
2. Rahamath Tharikeri, Maradolagana Kichchu, *Abhinava Publishers*.
3. Kannada kali-Lingadevaru Halemane- A textbook to learn kannada by Non-kannadigas who come to study Diploma, Engineering and Health sciences in Karnataka, published by *prasaranga kannada university*, Hampi.
4. Spoken Kannada- maataaduva kannada –*published by sahitya parishat Bengaluru*.
5. Kannada kirana - *published by Bangalore institute of languages*.

Scheme of Evaluation of the CIE & Assessment Pattern :

Assignment : Only one assignment (open book test normally) will be of 10 marks & conducted in the class during the course of the semester (normally midway thro' the semester or in between 2nd & 3rd test). Generally, 2- 4 questions can be given which has to be solved in 1 hour duration, the assignment question has to be from the self-study component or it can be a coding demo done in the laptop & shown on the spot to the teacher in the class, the questions has to be set according to easy, medium, tough & severe.

Quiz : There will be 1 quiz of 30 questions of 1 marks each, which will be reduced to 10 marks, which may be conducted along with the 2nd CIE test or at the appropriate time during the course of the semester as per the calendar of events.

CIE : There will be 3 CIE tests in a semester conducted for 50 marks each with 10 Marks MCQs, remaining 40 Marks descriptive (with theory & problems) & finally each CIE will be reduced to 10 Marks and totaled up for 30 Marks and then rounded off to the nearest integer. There has to be choices in the descriptive questions & the questions has to be set model-wise.

CIE – Continuous Internal Evaluation

Bloom's Category	**Test**	**Assignment**	**Quiz**
Marks	**30**	**10**	**10**
Remember	10	10	10
Understand	10	0	0
Apply	10	0	0

Scheme of evaluation

CIE (50 marks)				
CIE	Internal Assessment Test	Marks		
		Test marks out of 30	Total final CIE marks	Final CIE Marks
	Test (only 1 test during third internals)	30 marks max.	30 + 10 (Only 1 Assignment) + 10 (Quiz) = 50 marks	50 marks Max.