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)

Programme: B.E: Electronics & Communication Engineering

III SEMESTER

Sl. 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	18MAT31	Transform Calculus, Fourier Series and Numerical Techniques	Mathematics	2	2	--	03	40	60	100	3
2	PCC	18EC32	Network Theory		3	2	--	03	40	60	100	4
3	PCC	18EC33	Electronic Devices		3	0	--	03	40	60	100	3
4	PCC	18EC34	Digital System Design		3	0	--	03	40	60	100	3
5	PCC	18EC35	Computer Organization & Architecture		3	0	--	03	40	60	100	3
6	PCC	18EC36	Power Electronics & Instrumentation		3	0	--	03	40	60	100	3
7	PCC	18ECL37	Electronic Devices & Instrumentation Laboratory		--	2	2	03	40	60	100	2
8	PCC	18ECL38	Digital System Design Laboratory		--	2	2	03	40	60	100	2
9	HSMC	18KVK39/49	Vyavaharika Kannada (Kannada for Communication)/	HSMC	--	2	--	--	100	--	100	1
		18KAK39/49	Aadalitha Kannada (Kannada for Administration)									
		OR										
		18CPC39/49	Constitution of India, Professional Ethics and Cyber Law		1	--	--	02	40	60		
					Examination is by objective type questions							
				TOTAL	**17 OR 18**	**10 OR 08**	**04**	**24 OR 26**	**420 OR 360**	**480 OR 540**	**900**	**24**

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engineering & Technology
Mijar, Moodbidri

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

18KVK39 Vyavaharika Kannada (Kannada for communication) is for non-Kannada speaking, reading and writing students and 18KAK39 Aadalitha Kannada (Kannada for Administration) is for students who speak, read and write Kannada.

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

10	NCMC	18MATDIP31	Additional Mathematics - I	Mathematics	02	01	--	03	40	60	100	0

(a)The mandatory non – credit courses Additional Mathematics I and II prescribed for III and IV semesters respectively, to the lateral entry Diploma holders admitted to III semester of BE/B.Tech programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the University examination. In case, any student fails to register for the said course/fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured F grade. In such a case, the students have to fulfill the requirements during subsequent semester/s to appear for SEE.

(b)These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

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 courses Engineering Graphics and Elements of Civil Engineering and Mechanics of the First Year Engineering Programme. These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

AICTE Activity Points to be earned by students admitted to BE/B. Tech/B. Plan day college programme (For more details refer to Chapter 6, AICTE Activity Point Programme, Model Internship Guidelines):

Over and above the academic grades, every Day College regular student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. Students transferred from other Universities to fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card.

The activities can be can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, minimum hours' requirement should be fulfilled. Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

D.V.
H.O.D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI 574 225

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)

Programme: B.E: Electronics & Communication Engineering

IV SEMESTER

Sl. 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	18MAT41	Complex Analysis, Probability and Statistical Methods	Mathematics	2	2	--	03	40	60	100	3
2	PCC	18EC42	Analog Circuits		3	2	--	03	40	60	100	4
3	PCC	18EC43	Control Systems		3	0	--	03	40	60	100	3
4	PCC	18EC44	Engineering Statistics & Linear Algebra		3	0	--	03	40	60	100	3
5	PCC	18EC45	Signals & Systems		3	0	--	03	40	60	100	3
6	PCC	18EC46	Microcontroller		3	0	--	03	40	60	100	3
7	PCC	18ECL47	Microcontroller Laboratory		--	2	2	03	40	60	100	2
8	PCC	18ECL48	Analog Circuits Laboratory		--	2	2	03	40	60	100	2
9	HSMC	18KVK39/49	Vyavaharika Kannada (Kannada for Communication)	HSMC	--	2	--	--	100	--	100	1
		18KAK39/49	Aadalitha Kannada (Kannada for Administration)									
			OR									
		18CPC39/49	Constitution of India, Professional Ethics and Cyber Law		1	--	--	02	40	60		
					Examination is by objective type questions							
				TOTAL	**17 OR 18**	**10 OR 08**	**04**	**24 OR 26**	**420 OR 360**	**480 OR 540**	**900**	**24**

H.O.D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

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

18KVK39/49 Vyavaharika Kannada (Kannada for communication) is for non-Kannada speaking, reading and writing students and
18KAK39/49 Aadalitha Kannada (Kannada for Administration) is for students who speak, read and write Kannada.

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

10	NCMC	18MATDIP41	Additional Mathematics – II	Mathematics	02	01	--	03	40	60	100	0

(a)The mandatory non – credit courses Additional Mathematics I and II prescribed for III and IV semesters respectively, to the lateral entry Diploma holders admitted to III semester of BE/B.Tech programs, shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the University examination. In case, any student fails to register for the said course/ fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured F grade. In such a case, the students have to fulfill the requirements during subsequent semester/s to appear for SEE.

(b) These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

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 courses Engineering Graphics and Elements of Civil Engineering and Mechanics of the First Year Engineering Programme. These Courses shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

AICTE activity Points: In case students fail to earn the prescribed activity Points, Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree only after the release of the Eighth semester Grade Card.

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engineering & Technology
Mijar, MOODBIDRI 574 225

B. E. COMMON TO ALL PROGRAMMES

Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

SEMESTER - III

TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES

Course Code	: 18MAT31	CIE Marks	: 40
Lecture Hours/Week (L:T:P) : (2:2:0)		SEE Marks	: 60
Total Number of Lecture Hours : 40 (8 Hrs / Module)		Exam Hours	: 03
CREDITS – 03			

Course Learning Objectives:

- To have an insight into Fourier series, Fourier transforms, Laplace transforms, Difference equations and Z-transforms.
- To develop the proficiency in variational calculus and solving ODEs arising in engineering applications, using numerical methods.

Module-1

Laplace Transforms: Definition and Laplace transform of elementary functions. Laplace transforms of Periodic functions and unit-step function – problems.
Inverse Laplace Transforms: Inverse Laplace transform - problems, Convolution theorem to find the inverse Laplace transform (without proof) and problems, solution of linear differential equations using Laplace transform.

Module-2

Fourier Series: Periodic functions, Dirichlet's condition. Fourier series of periodic functions period 2π and arbitrary period. Half range Fourier series. Practical harmonic analysis, examples from engineering field.

Module-3

Fourier Transforms: Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms. Simple problems.
Difference Equations and Z-Transforms: Difference equations, basic definition, z-transform-definition, Standard z-transforms, Damping and shifting rules, initial value and final value theorems (without proof) and problems, Inverse z-transform. Simple problems.

Module-4

Numerical Solutions of Ordinary Differential Equations (ODEs): Numerical solution of ODEs of first order and first degree- Taylor's series method, Modified Euler's method. Range - Kutta method of fourth order, Milne's and Adam-Bashforth predictor and corrector method (No derivations of formulae), Problems.

Module-5

Numerical Solution of Second Order ODEs: Runge -Kutta method and Milne's predictor and corrector method.(No derivations of formulae).

Calculus of Variations: Variation of function and functional, variational problems, Euler's equation, Geodesics, hanging chain, problems.

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

1. Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
2. Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
3. Make use of Fourier transform and Z-transform to illustrate discrete/ continuous function arising in wave and heat propagation, signals and systems.
4. Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
5. Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Textbooks

1. Advanced Engineering Mathematics, E. Kreyszig, John Wiley & Sons, 10th Edition, 2016
2. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 44th Edition, 2017
3. Engineering Mathematics, Srimanta Pal et al, Oxford University Press, 3rd Edition, 2016

Reference Books

1. Advanced Engineering Mathematics, C. Ray Wylie, Louis C. Barrett, McGraw-Hill Book Co, 6th Edition, 1995
2. Introductory Methods of Numerical Analysis, S. S. Sastry, Prentice Hall of India, 4th Edition 2010
3. Higher Engineering Mathematics, B.V. Ramana, McGraw-Hill, 11th Edition,2010
4. A Text Book of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, 2014
5. Advanced Engineering Mathematics, Chandrika Prasad and Reena Garg, Khanna Publishing, , 2018

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU EDUSAT PROGRAMME - 20

NETWORK THEORY

Course Code : 18EC32	CIE Marks : 40
Lecture Hours/Week : 03 + 2 (Tutorial)	SEE marks : 60
Total Number of Lecture Hours : 50 (10 Hrs / Module)	Exam Hours : 03
CREDITS : 04	

Course Learning Objectives: This course will enable students to:

- Describe basic network concepts emphasizing source transformation, source shifting, mesh and nodal techniques to solve for resistance/ impedance, voltage, current and power.
- Explain network Thevenin's, Millman's, Superposition, Maximum Power transfer and Norton's Theorems and apply them in solving the problems related to Electrical Circuits.
- Explain the behavior of networks subjected to transient conditions.
- Use applications of Laplace transforms to network problems.
- Study two port network parameters like Z, Y, T and h and their inter-relationships and applications.
- Study of RLC Series and parallel tuned circuit.

Module – 1

Basic Concepts: Practical sources, Source transformations, Network reduction using Star – Delta transformation, Loop and node analysis with linearly dependent and independent sources for DC and AC networks.

L1, L2, L3, L4

Module – 2

Network Theorems:
Superposition, Millman's theorems, Thevenin's and Norton's theorems, Maximum Power transfer theorem.

L1, L2, L3, L4

Module – 3

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 AC and DC excitations.

L1 , L2 , L3

Module – 4

Laplace Transformation & Applications: Solution of networks, step, ramp and impulse responses, waveform Synthesis.

L1, L2, L3, L4

Module – 5

Two port network parameters: Definition of Z, Y, h and Transmission parameters, modelling with these parameters, relationship between parameters sets.

Resonance:

Series Resonance: Variation of Current and Voltage with Frequency, Selectivity and Bandwidth, Q-Factor, Circuit Magnification Factor, Selectivity with Variable Capacitance, Selectivity with Variable Inductance.

Parallel Resonance: Selectivity and Bandwidth, Maximum Impedance Conditions with C, L and f Variable, current in Anti-Resonant Circuit, The General Case-Resistance Present in both Branches.

L1, L2, L3, L4

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

1. Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/source transformation/ source shifting.
2. Solve network problems by applying Superposition/ Thevenin's/ Norton's/ Maximum Power Transfer/ Millman's Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
3. Calculate current and voltages for the given circuit under transient conditions and Apply Laplace transform to solve the given network.
4. Solve the given network using specified two port network parameters - Z, Y, T & h.
5. Understand the concept of resonance and determine the parameters that characterize series/parallel Resonant Circuits.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Books:

1. M.E. Van Valkenburg (2000) —Network Analysis, Prentice Hall of India, 3rd edition, 2000, ISBN: 9780136110958.
2. Roy Choudhury - Networks and Systems, 2nd edition, New Age International Publications, 2006, ISBN: 9788122427677

Reference Books:

1. Hayt, Kemmerly and Durbin —Engineering Circuit Analysis, TMH 7th Edition, 2010.
2. J. David Irwin /R. Mark Nelms —Basic Engineering Circuit Analysis John Wiley, 8th ed, 2006.
3. Charles K Alexander and Mathew N O Sadiku — Fundamentals of Electric Circuits, Tata McGraw-Hill, 3rd Ed, 2009.

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

ELECTRONIC DEVICES

Course Code	: 18EC33	CIE Marks : 40
Lecture Hours/Week	: 03	SEE marks : 60
Total Number of Lecture Hours : 40 (8 Hours / Module)		Exam Hours : 03
CREDITS – 03		

Course Learning Objectives: This course will enable students to:

- Understand the basics of semiconductor physics and electronic devices.
- Describe the mathematical models BJTs and FETs along with the constructional details.
- Understand the construction and working principles of optoelectronic devices
- Understand the fabrication process of semiconductor devices and CMOS process integration.

Module-1

Semiconductors

Bonding forces in solids, Energy bands, Metals, Semiconductors and Insulators, Direct and Indirect semiconductors, Electrons and Holes, Intrinsic and Extrinsic materials, Conductivity and Mobility, Drift and Resistance, Effects of temperature and doping on mobility, Hall Effect.

(Text 1: 3.1.1, 3.1.2, 3.1.3, 3.1.4, 3.2.1, 3.2.3, 3.2.4, 3.4.1, 3.4.2, 3.4.3, 3.4.5).

L1,L2

Module-2

pn Junctions

Forward and Reverse biased junctions- Qualitative description of Current flow at a junction, reverse bias, Reverse bias breakdown- Zener breakdown, avalanche breakdown, Rectifiers. **(Text 1: 5.3.1, 5.3.3, 5.4, 5.4.1, 5.4.2, 5.4.3)** Optoelectronic Devices Photodiodes: Current and Voltage in an Illuminated Junction, Solar Cells, Photodetectors. Light Emitting Diode: Light Emitting materials.

(Text 1: 8.1.1, 8.1.2, 8.1.3, 8.2, 8.2.1), **L1,L2**

Module – 3

Bipolar Junction Transistor

Fundamentals of BJT operation, Amplification with BJTS, BJT Fabrication, The coupled Diode model (Ebers-Moll Model), Switching operation of a transistor, Cutoff, saturation, switching cycle, specifications, Drift in the base region, Base narrowing, Avalanche breakdown.

(Text 1: 7.1, 7.2, 7.3, 7.5.1, 7.6, 7.7.1, 7.7.2, 7.7.3) **L1,L2**

Module-4

Field Effect Transistors

Basic pn JFET Operation, Equivalent Circuit and Frequency Limitations, MOSFET- Two terminal MOS structure- Energy band diagram, Ideal Capacitance – Voltage Characteristics and Frequency Effects, Basic MOSFET Operation- MOSFET structure, Current-Voltage Characteristics.
(Text 2: 9.1.1, 9.4, 9.6.1, 9.6.2, 9.7.1, 9.7.2, 9.8.1, 9.8.2). **L1,L2**

Module-5

Fabrication of p-n junctions

Thermal Oxidation, Diffusion, Rapid Thermal Processing, Ion implantation, chemical vapour deposition, photolithography, Etching, metallization.
(Text 1: 5.1)

Integrated Circuits

Background, Evolution of ICs, CMOS Process Integration, Integration of Other Circuit Elements. **(Text 1: 9.1, 9.2, 9.3.1, 9.3.3).** **L1,L2**

Course outcomes: After studying this course, students will be able to:

1. Understand the principles of semiconductor Physics
2. Understand the principles and characteristics of different types of semiconductor devices
3. Understand the fabrication process of semiconductor devices
4. Utilize the mathematical models of semiconductor junctions for circuits and systems.
5. Identify the mathematical models of MOS transistors for circuits and systems.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Books:

1. Ben. G. Streetman, Sanjay Kumar Banerjee, "Solid State Electronic Devices", 7th Edition, Pearson Education, 2016, ISBN 978-93-325-5508-2.
2. Donald A Neamen, Dhrubes Biswas, "Semiconductor Physics and Devices", 4th Edition, McGraw Hill Education, 2012, ISBN 978-0-07-107010-2.

Reference Book:

1. S. M. Sze, Kwok K. Ng, "Physics of Semiconductor Devices", 3rd Edition, Wiley, 2018.
2. Adir Bar-Lev, "Semiconductor and Electronic Devices", 3rd Edition, PHI, 1993.

H. O. D.
Dept. Of Electronics & Communication
Aiva... Institute ... & Technology
Mijar, MOODBIDRI - 574225

DIGITAL SYSTEM DESIGN

Course Code : **18EC34**	CIE Marks : 40
Lecture Hours/Week : 03	SEE marks : 60
Total Number of Lecture Hours : 40 (8 Hours / Module)	Exam Hours : 03
CREDITS – 03	

Course Learning Objectives: This course will enable students to:

- Illustrate simplification of Algebraic equations using Karnaugh Maps and Quine-Mc Clusky Techniques.
- Design Decoders, Encoders, Digital Multiplexer, Adders, Subtractors and Binary Comparators.
- Describe Latches and Flip-flops, Registers and Counters.
- Analyze Mealy and Moore Models.
- Develop state diagrams Synchronous Sequential Circuits.
- Appreciate the applications of digital circuits.

Module – 1

Principles of combinational logic: Definition of combinational logic, canonical forms,
Generation of switching equations from truth tables, Karnaugh maps-3,4,5 variables, Incompletely specified functions (Don't care terms) Simplifying Max term equations, Quine-McCluskey techniques – 3 & 4 variables
(Text 1 - Chapter 3) **L1, L2, L3**

Module – 2

Analysis and design of combinational logic: Decoders, Encoders, Digital multiplexers, Adders and subtractors, Look ahead carry, Binary comparators.
(Text 1 - Chapter 4)
Programmable Logic Devices, Complex PLD, FPGA.
(Text 3 - Chapter 9, 9.6 to 9.8) **L1, L2, L3**

Module -3

Flip-Flops and its Applications: Basic Bistable elements, Latches, The master-slave flip-flops (pulse-triggered flip-flops): SR flip-flops, JK flip-flops, Characteristic equations, Registers, binary ripple counters, and synchronous binary counters.**(Text 2 - Chapter 6)** **L1, L2, L3**

Module -4

Sequential Circuit Design: Design of a synchronous counter, Design of a synchronous mod-n counter using clocked JK, D, T and SR flip-flops.
(Text 2 - Chapter 6)
Mealy and Moore models, State machine notation, Construction of state diagrams. **(Text 1 - Chapter 6)** **L1, L2, L3**

Module -5

Applications of Digital Circuits: Design of a Sequence Detector, Guidelines for construction of state graphs, Design Example – Code Converter, Design of Iterative Circuits (Comparator), Design of Sequential Circuits using ROMs and PLAs, CPLDs and FPGAs, Serial Adder with Accumulator, Design of Binary Multiplier, Design of Binary Divider.
(Text 3 – 14.1, 14.3, 16.2, 16.3, 16.4, 18.1, 18.2, 18.3) **L1, L2, L3**

Course Outcomes: After studying this course, students will be able to:

1. Explain the concept of combinational and sequential logic circuits.
2. Analyze and Design the combinational logic circuits.
3. Describe and characterize flip-flops and its applications.
4. Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines.
5. Design applications of Combinational & Sequential Circuits.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Books:

1. John M Yarbrough -Digital Logic Applications and Design, Thomson Learning, 2001.
2. Donald D. Givone —Digital Principles and Design, McGraw Hill, 2002.
3. Charles H Roth Jr., Larry L. Kinney —Fundamentals of Logic Design, Cengage Learning, 7th Edition.

Reference Books:

1. D. P. Kothari and J. S Dhillon, —Digital Circuits and Design, Pearson, 2016.
2. Morris Mano, —Digital Design, Prentice Hall of India, Third Edition.
3. K. A. Navas —Electronics Lab Manual, Volume I, PHI, 5th Edition, 2015.

H.O.D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code	: 18EC35	CIE Marks : 40
Lecture Hours/Week	: 03	SEE Marks : 60
Total Number of Lecture Hours : 40 (8 Hours / Module)		Exam Hours : 03
CREDITS–03		

Course Learning Objectives: This course will enable students to:

- Explain the basic sub systems of a computer, their organization, structure and operation.
- Illustrate the concept of programs as sequences of machine instructions.
- Demonstrate different ways of communicating with I/O devices
- Describe memory hierarchy and concept of virtual memory.
- Illustrate organization of simple pipelined processor and other computing systems.

Module 1

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance – Processor Clock, Basic Performance Equation **(up to 1.6.2 of Chap 1 of Text).**

Machine Instructions and Programs: Numbers, Arithmetic Operations and Characters, IEEE standard for Floating point Numbers, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing **(up to 2.4.6 of Chap 2 and 6.7.1 of Chap 6 of Text). L1, L2, L3**

Module 2

Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions **(from 2.4.7 of Chap2, except 2.9.3, 2.11 & 2.12 of Text). L1, L2, L3**

Module 3

Input/Output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Direct Memory Access

(up to 4.2.4 and 4.4 except 4.4.1 of Chap 4 of Text). L1, L2, L3

Module 4

Memory System: Basic Concepts, Semiconductor RAM Memories-Internal organization of memory chips, Static memories, Asynchronous DRAMS, Read Only Memories, Cash Memories, Virtual Memories, Secondary Storage-Magnetic Hard Disks **(5.1, 5.2, 5.2.1, 5.2.2, 5.2.3, 5.3, 5.5 (except 5.5.1 to 5.5.4), 5.7 (except 5.7.1), 5.9, 5.9.1 of Chap 5 of Text). L1, L2, L3**

Module 5

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hardwired Control, Microprogrammed Control **(up to 7.5 except 7.5.1 to 7.5.6 of Chap 7 of Text).**

L1,L2, L3

Course Outcomes: After studying this course, students will be able to:

1. Explain the basic organization of a computer system.
2. Describe the addressing modes, instruction formats and program control statement.
3. Explain different ways of accessing an input / output device including interrupts.
4. Illustrate the organization of different types of semiconductor and other secondary storage memories.
5. Illustrate simple processor organization based on hardwired control and micro programmed control.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Book:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002.

Reference Books:

1. David A. Patterson, John L. Hennessy: Computer Organization and Design – The Hardware / Software Interface ARM Edition, 4th Edition, Elsevier, 2009.
2. William Stallings: Computer Organization & Architecture, 7th Edition, PHI, 2006.
3. Vincent P. Heuring & Harry F. Jordan: Computer Systems Design and Architecture, 2nd Edition, Pearson Education, 2004.

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

POWER ELECTRONICS AND INSTRUMENTATION

Course Code : 18EC36	CIE Marks : 40
Lecture Hours/Week : 03	SEE marks : 60
Total Number of Lecture Hours : 40 (8 Hrs / Module)	Exam Hours : 03
CREDITS – 03	

Course Learning Objectives: This course will enable students to:

- Study and analysis of thyristor circuits with different triggering conditions.
- Learn the applications of power devices in controlled rectifiers, converters and inverters.
- Understand types of instrument errors.
- Develop circuits for multirange Ammeters and Voltmeters.
- Describe principle of operation of digital measuring instruments and Bridges.
- Understand the operation of Transducers, Instrumentation amplifiers and PLCs.

Module - 1

Introduction: History, Power Electronic Systems, Power Electronic Converters and Applications (**1.2, 1.3 1.5 & 1.6 of Text 1).**

Thyristors: Static Anode-Cathode characteristics and Gate characteristics of SCR, Turn-ON methods, Turn-OFF mechanisms (**2.3, 2.6 without 2.6.1),** 2.7, **2.9 of text 1**),

Turn-OFF Methods: Natural and Forced Commutation – Class A and Class B types (**refer 2.10 without design considerations**),

Gate Trigger Circuit: Resistance Firing Circuit, Resistance capacitance firing circuit (**refer 3.5 up to 3.5.2 of Text 1**),

Unijunction Transistor: Basic operation and UJT Firing Circuit (**refer 3.6, up to 3.6.4, except 3.6.2**).

L1, L2

Module - 2

Phase Controlled Converter: Control techniques, Single phase half wave and full wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode (**refer Chapter 6 of Text 1 up to 6.4.1 without derivations**).

Choppers: Chopper Classification, Basic Chopper operation: step-down, step-up and step-up/down choppers. (**refer Chapter 8 of Text 1 up to 8.3.3**)

L1, L2, L3

Module - 3

Inverters: Classification, Single phase Half bridge and full bridge inverters with R and RL load (**refer Chapter 9 of Text 1 up to 9.4.2 without Circuit Analysis**).

Switched Mode Power Supplies: Isolated Flyback Converter, Isolated Forward Converter (**only refer to the circuit operations in section 16.3 of Text 1 up to 16.3.2 except 16.3.1.3 and derivations**).

Principles of Measurement: Static Characteristics, Error in Measurement, Types of Static Error. (Text 2: 1.2-1.6)

Multirange Ammeters, Multirange voltmeter. (Text 2: 3.2, 4.4)

L1, L2, L3

Module - 4

Digital Voltmeter: Ramp Technique, Dual slope integrating Type DVM, Direct Compensation type and Successive Approximations type DVM (Text 2: 5.1-5.3, 5.5, 5.6)

Digital Multimeter: Digital Frequency Meter and Digital Measurement of Time, Function Generator.

Bridges: Measurement of resistance: Wheatstone's Bridge, AC Bridges - Capacitance and Inductance Comparison bridge, Wien's bridge.

(Text 2: refer 6.2, 6.3 up to 6.3.2, 6.4 up to 6.4.2, 8.8, 11.2, 11.8-11.10, 11.14).

L1, L2

Module - 5

Transducers: Introduction, Electrical Transducer, Resistive Transducer, Resistive position Transducer, Resistance Wire Strain Gauges, Resistance Thermometer, Thermistor, LVDT.

(Text 2: 13.1-13.3, 13.5, 13.6 up to 13.6.1, 13.7, 13.8, 13.11).

Instrumentation Amplifier using Transducer Bridge, Temperature indicators using Thermometer, Analog Weight Scale (Text 2: 14.3.3, 14.4.1, 14.4.3).

Programmable Logic Controller: Structure, Operation, Relays and Registers (Text 2: 21.15, 21.15.2, 21.15.3, 21.15.5, 21.15.6).

L1, L2, L3

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

1. Build and test circuits using power electronic devices.
2. Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.
3. Analyze instrument characteristics and errors.
4. Describe the principle of operation and develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.
5. Explain the principle, design and analyze the transducers for measuring physical parameters.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Books:

1. M.D Singh and K B Khanchandani, Power Electronics, 2nd Edition, Tata Mc-Graw Hill, 2009, ISBN: 0070583897
2. H. S. Kalsi, "Electronic Instrumentation", McGraw Hill, 3rd Edition, 2012, ISBN: 9780070702066.

Reference Books:

1. Mohammad H Rashid, Power Electronics, Circuits, Devices and Applications, 3rd/4th Edition, Pearson Education Inc, 2014, ISBN: 978-93-325-1844-5.
2. L. Umanand, Power Electronics, Essentials and Applications, John Wiley India Pvt. Ltd, 2009.
3. David A. Bell, "Electronic Instrumentation & Measurements", Oxford University Press PHI 2nd Edition, 2006, ISBN 81-203-2360-2.
4. A. D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measuring Techniques", Pearson, 1st Edition, 2015, ISBN: 9789332556065.

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

ELECTRONIC DEVICES AND INSTRUMENTATION LABORATORY

Course Code : **18ECL37**	CIE Marks : 40	SEE Marks : 60
Lecture Hours/Week: 02 Hours Tutorial (Instructions) + 02 Hours Laboratory		
RBT Level : L1, L2, L3	Exam Hours : 03	
CREDITS – 02		

Course Learning Objectives: This laboratory course enables students to

- Understand the circuit schematic and its working.
- Study the characteristics of different electronic devices.
- Design and test simple electronic circuits as per the specifications using discrete electronic components.
- Familiarize with EDA software which can be used for electronic circuit simulation.

PART A : Experiments using Discrete components

1. Conduct experiment to test diode clipping (single/double ended) and clamping circuits (positive/negative).
2. Half wave rectifier and Full wave rectifier with and without filter and measure the ripple factor.
3. Characteristics of Zener diode and design a Simple Zener voltage regulator determine line and load regulation.
4. Characteristics of LDR and Photo diode and turn on an LED using LDR
5. Static characteristics of SCR.
6. SCR Controlled HWR and FWR using RC triggering circuit
7. Conduct an experiment to measure temperature in terms of current/ voltage using a temperature sensor bridge.
8. Measurement of Resistance using Wheatstone and Kelvin's bridge.

PART-B : Simulation using EDA software

(EDWinXP, PSpice, MultiSim, Proteus, Circuit Lab or any equivalent tool)

1. Input and Output characteristics of BJT Common emitter configuration and evaluation of parameters.
2. Transfer and drain characteristics of a JFET and MOSFET.
3. UJT triggering circuit for Controlled Full wave Rectifier.
4. Design and simulation of Regulated power supply.

Course Outcomes: On the completion of this laboratory course, the students will be able to:

1. Recognize and demonstrate functioning of semiconductor power devices.
2. Evaluate the characteristics, switching, power conversion and control by semiconductor power devices.
3. Analyze the response and plot the characteristics of transducers such as LDR, Photo diode, etc.
4. Design and test simple electronic circuits for measurement of temperature and resistance.
5. Use circuit simulation software for the implementation and characterization of electronic circuits and devices.

Conduct of Practical Examination:

- All laboratory experiments are to be considered for practical examination.
- For examination one question from **PART-A** and one question from **PART-B or** only one question from **PART-A** experiments based on the complexity, to be set.
- Students are allowed to pick one experiment from the lot.
- Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
- Change of experiment is allowed only once and Marks allotted to the procedure part to be made zero.

Text Books

1. David A Bell, "Fundamentals of Electronic Devices and Circuits Lab Manual, 5th Edition, 2009, Oxford University Press.
2. Muhammed H Rashid, "Introduction to PSpice using OrCAD for circuits and electronics", 3rd Edition, Prentice Hall, 2003.

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

DIGITAL SYSTEM DESIGN LABORATORY

Course Code : **18ECL38**	CIE Marks : 40	SEE Marks : 60
Lecture Hours/Week: 02 Hours Tutorial (Instructions) + 02 Hours Laboratory		
RBT Level : L1, L2, L3, L4	Exam Hours : 03	
CREDITS – 02		

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

- De Morgan's Theorem, SOP, POS forms
- Full/Parallel Adders, Subtractors and Magnitude Comparator
- Multiplexer using logic gates
- Demultiplexers and Decoders
- Flip-Flops, Shift registers and Counters.

NOTE:

1. Use discrete components to test and verify the logic gates.
2. The IC numbers given are suggestive; any equivalent ICs can be used.
3. For experiment No. 11 and 12 any open source or licensed simulation tool may be used.

Laboratory Experiments:

1. Verify (i) De Morgan's Theorem for 2 variables.
   (ii) The sum-of product and product-of-sum expressions using universal gates.
2. Design and implement
   (i) Half Adder & Full Adder using a) basic gates b) NAND gates
   (ii) Half subtractor & Full subtractor using a) basic gates b) NAND gates.
3. Design and implement
   (i) 4-bit Parallel Adder/Subtractor using IC 7483.
   (ii) BCD to Excess-3 code conversion and vice-versa.
4. Design and Implementation of
   (i) 1-bit Comparator.
   (ii) 5-bit Magnitude Comparator using IC 7485.
5. Realize
   (i) Adder & Subtractors using IC 74153.
   (ii) 4-variable function using IC74151(8:1MUX).

6. Realize

(i) Adder &Subtractors using IC74139.

(ii) Binary to Gray code conversion & vice-versa (74139)

7. Realize the following flip-flops using NAND Gates.

Master-Slave JK, D & T Flip-Flops.

8. Realize the following shift registers using IC7474/7495

(i) SISO (ii) SIPO (iii) PISO (iv) PIPO (v) Ring (vi) Johnson counter

9. Realize

(i) Design Mod – N Synchronous Up Counter & Down Counter using 7476 JK Flip-flop

(ii) Mod-N Counter using IC7490 / 7476

(iii) Synchronous counter using IC74192

10. Design Pseudo Random Sequence generator using 7495.

11.Design Serial Adder with Accumulator and Simulate using Simulation tool.

12. Design Binary Multiplier and Simulate using Simulation tool.

Course Outcomes: On the completion of this laboratory course, the students will be able to:

1. Design, realize and verify De Morgan's Theorem, SOP, POS forms
2. Demonstrate the truth table of various expressions and combinational circuits using logic gates.
3. Design various combinational circuits such as adders, subtractors, comparators, multiplexers and demultiplexers.
4. Construct flips-flops, counters and shift registers.
5. Simulate Serial adder and Binary Multiplier.

Conduct of Practical Examination:

- All laboratory experiments are to be included for practical examination.
- Students are allowed to pick one experiment from the lot.
- Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
- Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

SEMESTER –II / III / IV
Aadalitha Kannada

Course Code,	18KAK28/39/49,	CIE Marks, 100
Teaching Hours/Week (L:T:P),	(0:2:0)	
Credits , 01		

ಆಡಳಿತ ಕನ್ನಡ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- ಪದವಿ ವಿದ್ಯಾರ್ಥಿಳಾಗಿರುವುದರಿಂದ ಆಡಳಿತ ಕನ್ನಡದ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
- ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾ ರಚನೆಯಲ್ಲಿನ ನಿಯಮಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾ ಬರಹದಲ್ಲಿ ಕಂಡುಬರುವ ದೋಷಗಳು ಹಾಗೂ ಅವುಗಳ ನಿವಾರಣೆ. ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು.
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅಸಕ್ತಿ ಮೂಡಿಸುವುದು.
- ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಮತ್ತು ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

ಪರಿವಿಡಿ (ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿರುವ ವಿಷಯಗಳ ಪಟ್ಟಿ)

ಅಧ್ಯಾಯ – 1 ಕನ್ನಡಭಾಷೆ – ಸಂಕ್ಷಿಪ್ತ ವಿವರಣೆ.
ಅಧ್ಯಾಯ – 2 ಭಾಷಾ ಪ್ರಯೋಗದಲ್ಲಾಗುವ ಲೋಪದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ.
ಅಧ್ಯಾಯ – 3 ಲೇಖನ ಚಿಹ್ನೆಗಳು ಮತ್ತು ಅವುಗಳ ಉಪಯೋಗ.
ಅಧ್ಯಾಯ – 4 ಪತ್ರ ವ್ಯವಹಾರ.
ಅಧ್ಯಾಯ – 5 ಆಡಳಿತ ಪತ್ರಗಳು.
ಅಧ್ಯಾಯ – 6 ಸರ್ಕಾರದ ಆದೇಶ ಪತ್ರಗಳು.
ಅಧ್ಯಾಯ – 7 ಸಂಕ್ಷಿಪ್ತ ಪ್ರಬಂಧ ರಚನೆ (ಪ್ರಿಸೈಸ್ ರೈಟಿಂಗ್), ಪ್ರಬಂಧ ಮತ್ತು ಭಾಷಾಂತರ.
ಅಧ್ಯಾಯ – 8 ಕನ್ನಡ ಶಬ್ದಸಂಗ್ರಹ.
ಅಧ್ಯಾಯ – 9 ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ.
ಅಧ್ಯಾಯ – 10 ಪಾರಿಭಾಷಿಕ ಆಡಳಿತ ಕನ್ನಡ ಪದಗಳು ಮತ್ತು ತಾಂತ್ರಿಕ/ ಕಂಪ್ಯೂಟರ್ ಪಾರಿಭಾಷಿಕ ಪದಗಳು.

ಆಡಳಿತ ಕನ್ನಡ ಕಲಿಕೆಯ ಫಲಿತಾಂಶಗಳು:

- ಆಡಳಿತ ಭಾಷೆ ಕನ್ನಡದ ಪರಿಚಯವಾಗುತ್ತದೆ.
- ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡುತ್ತದೆ.
- ಕನ್ನಡ ಭಾಷಾ ರಚನೆಯಲ್ಲಿನ ನಿಯಮಗಳು ಮತ್ತು ಲೇಖನ ಚಿಹ್ನೆಗಳು ಪರಿಚಯಿಸಲ್ಪಡುತ್ತವೆ.
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು, ಸರ್ಕಾರಿ ಮತ್ತು ಅರೆ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡುತ್ತದೆ.
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅಸಕ್ತಿ ಮೂಡುತ್ತದೆ.

- ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ ಮತ್ತು ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳು ಪರಿಚಯಿಸಲ್ಪಡುತ್ತವೆ.

ಪರೀಕ್ಷೆಯ ವಿಧಾನ : ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ – CIE **(Continuous Internal Evaluation):**
ಕಾಲೇಜು ಮಟ್ಟದಲ್ಲಿಯೆ ಆಂತರಿಕ ಪರೀಕ್ಷೆಯನ್ನು 100 ಅಂಕಗಳಿಗೆ ವಿಶ್ವವಿದ್ಯಾಲಯದ ನಿಯಮಗಳು ಮತ್ತು ನಿರ್ದೇಶನದಂತೆ ನಡೆಸತಕ್ಕದ್ದು.

ಪಠ್ಯಪುಸ್ತಕ : ಆಡಳಿತ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ **(Kannada for Administration)**

ಸಂಪಾದಕರು

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

H. O. D.
Dept Of Electronics & Communication
Technology
Alva's Institute
Mijar, Moodbidri-574 225

Vyavaharika Kannada

Course Code,	18KVK28/39/49,	CIE Marks, 100
Teaching Hours/Week (L:T:P),	(0:2:0)	
	Credits , 01	

Course Learning Objectives:

The course will enable the students to understand Kannada and communicate in Kannada language.

Table of Contents:

Chapter - 1: Vyavaharika kannada – Parichaya (Introduction to Vyavaharika Kannada).

Chapter - 2: Kannada Aksharamale haagu uchcharane (Kannada Alpabets and Pronunciation).

Chapter - 3: Sambhashanegaagi Kannada Padagalu (Kannada Vocabulary for Communication).

Chapter - 4: Kannada Grammar in Conversations (Sambhashaneyalli Kannada Vyakarana).

Chapter - 5: Activities in Kannada.

Course Outcomes:

At the end of the course, the student will be able to understand Kannada and communicate in Kannada language.

ಪರೀಕ್ಷೆಯ ವಿಧಾನ : ನಿರಂತರ ಆಂತರಿಕ ಮೌಲ್ಯಮಾಪನ–CIE **(Continuous Internal Evaluation):**

ಕಾಲೇಜು ಮಟ್ಟದಲ್ಲಿಯೆ ಆಂತರಿಕ ಪರೀಕ್ಷೆಯನ್ನು 100 ಅಂಕಗಳಿಗೆ ವಿಶ್ವವಿದ್ಯಾಲಯದ ನಿಯಮಗಳು ಮತ್ತು ನಿರ್ದೇಶನದಂತೆ ನಡೆಸತಕ್ಕದ್ದು.

Textbook (ಪಠ್ಯಪುಸ್ತಕ): ವ್ಯಾವಹಾರಿಕ ಕನ್ನಡ ಪಠ್ಯ ಪುಸ್ತಕ**(Vyavaharika Kannada Text Book)**

ಸಂಪಾದಕರು

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW (CPC)

Course Code	: 18CPC39/49	CIE Marks : 40
Lecture Hours/Week (L:T:P)	: (1:0:0)	SEE Marks : 60
Credits : 01		Exam Hours : 02

Course Learning Objectives: To

- know the fundamental political codes, structure, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens
- Understand engineering ethics and their responsibilities; identify their individual roles and ethical responsibilities towards society.
- Know about the cybercrimes and cyber laws for cyber safety measures.

Module-1

Introduction to Indian Constitution:

The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India. Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building.

Module-2

Union Executive and State Executive:

Parliamentary System, Federal System, Centre-State Relations. Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism. State Executives – Governor, Chief Minister, State Cabinet, State Legislature, High Court and Subordinate Courts, Special Provisions (Articles 370, 371,371J) for some States.

Module-3

Elections, Amendments and Emergency Provisions:

Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments - Methods in Constitutional Amendments (How and Why) and Important Constitutional Amendments. Amendments – 7, 9, 10, 12, 42, 44,

61, 73, 74, 75, 86 and 91, 94, 95, 100, 101, 118 and some important Case Studies. Emergency Provisions, types of Emergencies and its consequences.

Constitutional special provisions:

Special Provisions for SC and ST, OBC, Women, Children and Backward Classes.

Module-4

Professional / Engineering Ethics:

Scope & Aims of Engineering & Professional Ethics - Business Ethics, Corporate Ethics, Personal Ethics. Engineering and Professionalism, Positive and Negative Faces of Engineering Ethics, Code of Ethics as defined in the website of Institution of Engineers (India): Profession, Professionalism, and Professional Responsibility. Clash of Ethics, Conflicts of Interest. Responsibilities in Engineering Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. Trust and Reliability in Engineering, IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering

Module-5

Internet Laws, Cyber Crimes and Cyber Laws:

Internet and Need for Cyber Laws, Modes of Regulation of Internet, Types of cyber terror capability, Net neutrality, Types of Cyber Crimes, India and cyber law, Cyber Crimes and the information Technology Act 2000, Internet Censorship. Cybercrimes and enforcement agencies.

Course Outcomes: On completion of this course, students will be able to,

1. Describe and analyze the role and salient features of the Indian Constitution
2. Understand the structure and powers of the Union and State Executives.
3. Relate to the procedures and provisions in the electoral process.
4. Develop Engineering and Professional ethics and adopt the responsibilities expected of an Engineer.
5. Identify the cybercrimes and describe the cyber laws for cyber safety measures.

Question paper pattern for SEE and CIE:

- The SEE question paper will be set for 100 marks and the marks scored by the students will proportionately be reduced to 60. The pattern of the question paper will be objective type (MCQ).
- For the award of 40 CIE marks, refer the University regulations 2018.

Textbook/s

1. Constitution of India, Professional Ethics and Human Rights, Shubham Singles, Charles E. Haries, and et al, Cengage Learning India, 2018

2. Cyber Security and Cyber Laws, Alfred Basta and et. al., Cengage Learning India, 2018

Reference Books

1. Introduction to the Constitution of India, Durga Das Basu, Prentice – Hall, 2008.
2. Engineering Ethics, M. Govindarajan, S. Natarajan, V. S. Senthilkumar, Prentice – Hall, 2004

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

ADDITIONAL MATHEMATICS – I

Course Code	: 18MATDIP31	CIE Marks : 40
Lecture Hours/Week (L:T:P) : (2:1:0)		SEE Marks : 60
Credits : 0		Exam Hours : 03

Course Learning Objectives:

- To provide basic concepts of complex trigonometry, vector algebra, differential and integral calculus.
- To provide an insight into vector differentiation and first order ODEs.

Module-1

Complex Trigonometry: Complex Numbers: Definitions and properties. Modulus and amplitude of a complex number, Argand's diagram, De-Moivre's theorem (without proof).

Vector Algebra: Scalar and vectors. Addition and subtraction and multiplication of vectors- Dot and Cross products, problems.

Module-2

Differential Calculus: Review of elementary differential calculus. Polar curves –angle between the radius vector and the tangent pedal equation- Problems. Maclaurin's series expansions, problems.

Partial Differentiation: Euler's theorem for homogeneous functions of two variables. Total derivatives - differentiation of composite function. Application to Jacobians of order two.

Module-3

Vector Differentiation: Differentiation of vector functions. Velocity and acceleration of a particle moving on a space curve. Scalar and vector point functions. Gradient, Divergence, Curl and Laplacian (Definitions only). Solenoidal and irrotational vector fields-Problems.

Module-4

Integral Calculus: Review of elementary integral calculus. Statement of reduction formulae for $\sin^n x, \cos^n x,$ and $\sin^m x \times \cos^n x$ and evaluation of these with standard limits-Examples. Double and triple integrals, problems.

Module-5

Ordinary differential equations (ODEs): Introduction-solutions of first order and first degree differential equations: Variable Separable methods, exact and linear differential equations of order one. Application to Newton's law of cooling.

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

1. Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area.
2. Use derivatives and partial derivatives to calculate rate of change of multivariate functions.
3. Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.
4. Learn techniques of integration including the evaluation of double and triple integrals.
5. Identify and solve first order ordinary differential equations.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Textbook

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 43rd Edition, 2015

Reference Books

1. Advanced Engineering Mathematics, E. Kreyszig, John Wiley & Sons, 10th Edition, 2015
2. Engineering Mathematics Vol.I, Rohit Khurana, Cengage Learning, 2015

H.O.D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

SEMESTER - IV

COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS

Course Code	: 18MAT41	CIE Marks	: 40
Lecture Hours/Week (L:T:P) : (2:2:0)		SEE Marks	: 60
Total Number of Lecture Hours : 40 (8 Hrs / Module)		Exam Hours	: 03
CREDITS : 03			

Course Learning Objectives:

- To provide an insight into applications of complex variables, conformal mapping and special functions arising in potential theory, quantum mechanics, heat conduction and field theory.
- To develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, design engineering and microwave engineering.

Module-1

Calculus of complex functions: Review of function of a complex variable, limits, continuity, and differentiability. Analytic functions: Cauchy-Riemann equations in Cartesian and polar forms and consequences.
Construction of analytic functions: Milne-Thomson method-Problems.

Module-2

Conformal transformations: Introduction. Discussion of transformations: $w = Z^2$, $w = e^z$, $w = z + 1/z$ $(z \neq 0)$. Bilinear transformations- Problems.
Complex integration: Line integral of a complex function-Cauchy's theorem and Cauchy's integral formula and problems.

Module-3

Probability Distributions: Review of basic probability theory. Random variables (discrete and continuous), probability mass/density functions. Binomial,

Poisson, exponential and normal distributions- problems (No derivation for mean and standard deviation)-Illustrative examples.

Module-4

Statistical Methods: Correlation and regression-Karl Pearson's coefficient of correlation and rank correlation -problems. Regression analysis- lines of regression –problems.

Curve Fitting: Curve fitting by the method of least squares- fitting the curves of the form-

$y = ax + b$, $y = ax^b$ and $y = ax^2 + bx + c$

Module-5

Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation and covariance.

Sampling Theory: Introduction to sampling distributions, standard error, Type-I and Type-II errors. Test of hypothesis for means, student's t-distribution, Chi-square distribution as a test of goodness of fit.

Course Outcomes:

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

1. Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
2. Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
3. Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
4. Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
5. Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.

- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Textbooks

1. Advanced Engineering Mathematics, E. Kreyszig, John Wiley & Sons, 10th Edition, 2016
2. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 44th Edition, 2017
3. Engineering Mathematics, Srimanta Pal et. al., Oxford University Press, 3rd Edition, 2016

Reference Books

1. Advanced Engineering Mathematics, C. Ray Wylie, Louis C. Barrett, McGraw-Hill , 6th Edition 1995
2. Introductory Methods of Numerical Analysis, S.S.Sastry, Prentice Hall of India, 4th Edition 2010
3. Higher Engineering Mathematics, B. V. Ramana, McGraw-Hill, 11th Edition, 2010
4. A Text Book of Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publications, 2014

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU EDUSAT PROGRAMME - 20

D.V.T

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg & Technology
Mijar, MOODBIDRI - 574 225

B. E. 2018 Scheme Fourth Semester Syllabus (EC / TC)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

ANALOG CIRCUITS

Course Code : **18EC42**	CIE Marks : 40
Lecture Hours/Week : 03 + 2 (Tutorial)	SEE marks : 60
Total Number of Lecture Hours : 50 (10 Hrs / Module)	Exam Hours : 03
CREDITS : 04	

Course Learning Objectives: This course will enable students to:

- Explain various BJT parameters, connections and configurations.
- Design and demonstrate the diode circuits and transistor amplifiers.
- Explain various types of FET biasing, and demonstrate the use of FET amplifiers.
- Construct frequency response of FET amplifiers at various frequencies.
- Analyze Power amplifier circuits in different modes of operation.
- Construct Feedback and Oscillator circuits using FET.

Module -1

BJT Biasing: Biasing in BJT amplifier circuits: The Classical Discrete circuit bias (Voltage-divider bias), Biasing using a collector to base feedback resistor.
Small signal operation and Models: Collector current and transconductance, Base current and input resistance, Emitter current and input resistance, voltage gain, Separating the signal and the DC quantities, The hybrid Π model.
MOSFETs: Biasing in MOS amplifier circuits: Fixing V_{GS}, Fixing V_G, Drain to Gate feedback resistor.
Small signal operation and modeling: The DC bias point, signal current in drain, voltage gain, small signal equivalent circuit models, transconductance.
[Text 1: 3.5(3.5.1, 3.5.3), 3.6(3.6.1 to 3.6.6), 4.5(4.5.1, 4.5.2, 4.5.3), 4.6(4.6.1 to 4.6.6)] **L1, L2,L3**

Module -2

MOSFET Amplifier configuration: Basic configurations, characterizing amplifiers, CS amplifier with and without source resistance R_S, Source follower.
MOSFET internal capacitances and High frequency model: The gate capacitive effect, Junction capacitances, High frequency model.
Frequency response of the CS amplifier: The three frequency bands, high frequency response, Low frequency response.

Oscillators: FET based Phase shift oscillator, LC and Crystal Oscillators (no derivation)

[Text 1: 4.7(4.7.1 to 4.7.4, 4.7.6) 4.8(4.8.1, 4.8.2, 4.8.3), 4.9, 12.2.2, 12.3.1, 12.3.2] **L1, L2, L3**

Module -3

Feedback Amplifier: General feedback structure, Properties of negative feedback, The Four Basic Feedback Topologies, The series-shunt, series-series, shunt-shunt and shunt-series amplifiers (Qualitative Analysis)

Output Stages and Power Amplifiers: Introduction, Classification of output stages,, Class A output stage, Class B output stage: Transfer Characteristics, Power Dissipation, Power Conversion efficiency, Class AB output stage, Class C tuned Amplifier.

[Text 1: 7.1, 7.2, 7.3, 7.4.1, 7.5.1, 7.6 (7.6.1 to 7.6.3), 13.1, 13.2, 13.3 (13.3.1, 13.3.2, 13.3.3, 13.4, 13.7)] **L1, L2, L3**

Module -4

Op-Amp with Negative Feedback and general applications

Inverting and Non inverting Amplifiers – Closed Loop voltage gain, Input impedance, Output impedance, Bandwidth with feedback. DC and AC Amplifiers, Summing, Scaling and Averaging Amplifiers, Instrumentation amplifier, Comparators, Zero Crossing Detector, Schmitt trigger.

[Text 2: 3.3(3.3.1 to 3.3.6), 3.4(3.4.1 to 3.4.5) 6.2, 6.5, 6.6 (6.6.1), 8.2, 8.3, 8.4] **L1, L2, L3**

Module -5

Op-Amp Circuits: DAC - Weighted resistor and R-2R ladder, ADC- Successive approximation type, Small Signal half wave rectifier, Active Filters, First and second order low-pass and high-pass Butterworth filters, Band-pass filters, Band reject filters.

555 Timer and its applications: Monostable and a stable Multivibrators.

[Text 2: 8.11(8.11.1a, 8.11.1b), 8.11.2a, 8.12.2, 7.2, 7.3, 7.4, 7.5, 7.6, 7.8, 7.9, 9.4.1, 9.4.1(a), 9.4.3, 9.4.3(a)] **L1, L2, L3**

Course Outcomes: At the end of this course students will demonstrate the ability to

1. Understand the characteristics of BJTs and FETs.
2. Design and analyze BJT and FET amplifier circuits.
3. Design sinusoidal and non-sinusoidal oscillators.
4. Understand the functioning of linear ICs.
5. Design of Linear IC based circuits.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Books:

1. Microelectronic Circuits, Theory and Applications, Adel S Sedra, Kenneth C Smith, 6th Edition, Oxford, 2015. ISBN:978-0-19-808913-1
2. Op-Amps and Linear Integrated Circuits, Ramakant A Gayakwad, 4th Edition. Pearson Education, 2000. ISBN: 8120320581

Reference Books:

1. Electronic Devices and Circuit Theory, Robert L Boylestad and Louis Nashelsky, 11th Edition, Pearson Education, 2013, ISBN: 978-93-325-4260-0.
2. Fundamentals of Microelectronics, Behzad Razavi, 2nd Edition, John Weily, 2015, ISBN 978-81-265-7135-2
3. J.Millman & C.C. Halkias—Integrated Electronics, 2nd edition, 2010, TMH. ISBN 0-07-462245-5

H.O.D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

CONTROL SYSTEMS

Course Code	: **18EC43**	CIE Marks : 40
Lecture Hours/Week : 3		SEE Marks : 60
Total Number of Lecture Hours : 40(8 Hrs/Module)		Exam Hours: 03
CREDITS – 03		

Course Learning Objectives: This course will enable students to:

- Understand the basic features, configurations and application of control systems.
- Understand various terminologies and definitions for the control systems.
- Learn how to find a mathematical model of electrical, mechanical and electro- mechanical systems.
- Know how to find time response from the transfer function.
- Find the transfer function via Masons' rule.
- Analyze the stability of a system from the transfer function.

Module – 1

Introduction to Control Systems: Types of Control Systems, Effect of Feedback Systems, Differential equation of Physical Systems –Mechanical Systems, Electrical Systems, Electromechanical systems, Analogous Systems.

L1, L2, L3

Module – 2

Block diagrams and signal flow graphs: Transfer functions, Block diagram algebra and Signal Flow graphs.

L1, L2, L3

Module – 3

Time Response of feedback control systems: Standard test signals, Unit step response of First and Second order Systems. Time response specifications, Time response specifications of second order systems, steady state errors and error constants. Introduction to PI, PD and PID Controllers (excluding design). **L1, L2, L3**

Module – 4

Stability analysis: Concepts of stability, Necessary conditions for Stability, Routh stability criterion, Relative stability analysis: more on the Routh stability criterion.

Introduction to Root-Locus Techniques, The root locus concepts, Construction of rootloci.

Frequency domain analysis and stability: Correlation between time and frequency response, Bode Plots, Experimental determination of transfer function.

L1, L2, L3

Module – 5

Introduction to Polar Plots, (Inverse Polar Plots excluded) Mathematical preliminaries, Nyquist Stability criterion, (Systems with transportation lag excluded)

Introduction to lead, lag and lead- lag compensating networks (excluding design).

Introduction to State variable analysis: Concepts of state, state variable and state models for electrical systems, Solution of state equations.

L1, L2, L3

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

1. Develop the mathematical model of mechanical and electrical systems.
2. Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method.
3. Determine the time domain specifications for first and second order systems.
4. Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique.
5. Determine the s stability of a system in the frequency domain using Nyquist and bode plots.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Book:

1. J. Nagarath and M. Gopal, "Control Systems Engineering", New Age International(P) Limited, Publishers, Fifth edition- 2005, ISBN: 81 - 224 - 2008-7.

Reference Books:

1. "Modern Control Engineering", K. Ogata, Pearson Education Asia/ PHI, 4th Edition, 2002. ISBN 978 - 81 - 203 - 4010 - 7.
2. "Automatic Control Systems", Benjamin C. Kuo, John Wiley India Pvt. Ltd., 8th Edition, 2008.
3. "Feedback and Control System," Joseph J Distefano III et. al., Schaum's Outlines, TMH, 2nd Edition 2007.

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

ENGINEERING STATISTICS and LINEAR ALGEBRA

Course Code : **18EC44**	CIE Marks : 40
Lecture Hours/Week : 03	SEE Marks : 60
Total Number of Lecture Hours: 40 (8 Hrs / Module)	Exam Hours : 03
CREDITS – 03	

Course Learning Objectives: This course will enable students to:

- Understand and Analyze Single and Multiple Random Variables, and their extension to Random Processes.
- Familiarization with the concept of Vector spaces and orthogonality with a qualitative insight into applications in communications.
- Compute the quantitative parameters for functions of single and Multiple Random Variables and Processes.
- Compute the quantitative parameters for Matrices and Linear Transformations.

Module-1

Single Random Variables: Definition of random variables, cumulative distribution function continuous and discrete random variables; probability mass function, probability density functions and properties; Expectations, Characteristic functions, Functions of single Random Variables, Conditioned Random variables. Application exercises to Some special distributions: Uniform, Exponential, Laplace, Gaussian, Binomial, and Poisson distribution. **(Chapter 4 Text 1),** **L1, L2, L3**

Module -2

Multiple Random variables: Concept, Two variable CDF and PDF, Two Variable expectations (Correlation, orthogonality, Independent), Two variable transformation, Two Gaussian Random variables, Sum of two independent Random Variables, Sum of IID Random Variables – Central limit Theorem and law of large numbers, Conditional joint Probabilities, Application exercises to Chi-square RV, Student-T RV, Cauchy and Rayleigh RVs.
(Chapter 5 Text 1), **L1, L2, L3**

Module-3

Random Processes: Ensemble, PDF, Independence, Expectations, Stationarity, Correlation Functions (ACF, CCF, Addition, and Multiplication), Ergodic Random Processes, Power Spectral Densities (Wiener Khinchin, Addition and Multiplication of RPs, Cross spectral densities), Linear Systems (output Mean, Cross correlation and Auto correlation of Input and output), Exercises with Noise. **(Chapter 6 Text 1),** **L1, L2, L3**

Module -4

Vector Spaces: Vector spaces and Null subspaces, Rank and Row reduced form, Independence, Basis and dimension, Dimensions of the four subspaces, Rank-Nullity Theorem, Linear Transformations

Orthogonality: Orthogonal Vectors and Subspaces, Projections and Least squares, Orthogonal Bases and Gram- Schmidt Orthogonalization procedure.

(Refer Chapters 2 and 3 Text 2), **L1, L2, L3**

Module -5

Determinants: Properties of Determinants, Permutations and Cofactors. **(Refer Chapter 4, Text 2)**

Eigen values and Eigen vectors: Review of Eigenvalues and Diagonalization of a Matrix, Special Matrices (Positive Definite, Symmetric) and their properties, Singular Value Decomposition.

(Refer Chapter 5, Text 2), **L1, L2, L3**

Course Outcomes: After studying this course, students will be able to:

1. Analyze and evaluate single and multiple random variables.
2. Identify and associate Random Variables and Random Processes in Communication events.
3. Analyze and model the Random events in typical communication events to extract quantitative statistical parameters.
4. Analyze and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency.
5. Demonstrate by way of simulation or emulation the ease of analysis employing basis functions, statistical representation and Eigen values.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Books:

1. Richard H Williams, "Probability, Statistics and Random Processes for Engineers" Cengage Learning, 1st Edition, 2003, ISBN 13: 978-0-534- 36888-3, ISBN 10: 0-534-36888-3.

2. Gilbert Strang, "Linear Algebra and its Applications", Cengage Learning, 4th Edition, 2006, ISBN 97809802327

Reference Books:

1. Hwei P. Hsu, "Theory and Problems of Probability, Random Variables, and Random Processes" Schaums Outline Series, McGraw Hill. ISBN 10: 0-07- 030644-3.
2. K. N. HariBhat, K Anitha Sheela, Jayant Ganguly, "Probability Theory and Stochastic Processes for Engineers", Cengage Learning India, 2019

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

SIGNALS AND SYSTEMS

Course Code : **18EC45**	CIE Marks : 40
Lecture Hours/Week : 03	SEE Marks : 60
Total Number of Lecture Hours : 40 (8 Hours / Module)	Exam Hours : 03
CREDITS – 03	

Course Learning Objectives: This course will enable students to:

- Understand the mathematical description of continuous and discrete time signals and systems.
- Analyze the signals in time domain using convolution sum and Integral.
- Classify signals into different categories based on their properties.
- Analyze Linear Time Invariant (LTI) systems in time and transform domains.

Module-1

Introduction and Classification of signals: Definition of signal and systems, communication and control system as examples Classification of signals.

Basic Operations on signals: Amplitude scaling, addition, multiplication, differentiation, integration, time scaling, time shift and time reversal.

Elementary signals/Functions: Exponential, sinusoidal, step,impulse and ramp functions. Expression of triangular, rectangular and other waveforms in terms of elementary signals.,

L1, L2, L3

Module -2

System Classification and properties: Linear-nonlinear, Time variant -invariant, causal-noncausal, static-dynamic, stable-unstable, invertible.

Time domain representation of LTI System: Impulse response, convolution sum, convolution integral. Computation of convolution sum and convolution integral using graphical method for unit step and unit step, unit step and exponential, exponential and exponential, unit step and rectangular, and rectangular and rectangular.

L1, L2, L3

Module-3

LTI system Properties in terms of impulse response: System interconnection, Memory less, Causal, Stable, Invertible and Deconvolution, and step response.

Fourier Representation of Periodic Signals: CTFS properties and basic problems.

L1, L2, L3

Module -4

Fourier Representation of aperiodic Signals: Introduction to Fourier Transform & DTFT, Definition and basic problems.

Properties of Fourier Transform: Linearity, Time shift, Frequency shift, Scaling, Differentiation and Integration, Convolution and Modulation, Parseval's theorem and problems on properties of Fourier Transform.

L1, L2, L3

Module -5

The Z-Transforms: Z transform, properties of the region of convergence, properties of the Z-transform, Inverse Z-transform, Causality and stability, Transform analysis of LTI systems. **L1, L2, L3**

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

1. Analyze the different types of signals and systems.
2. Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems.
3. Evaluate the convolution sum and integral.
4. Represent continuous and discrete signals & systems in frequency domain using Fourier representations.
5. Analyze discrete time signals and systems using Z-transforms.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Book:

1. Simon Haykin and Barry Van Veen, "Signals and Systems", 2nd Edition, 2008, Wiley India. ISBN 9971-51-239-4.

Reference Books:

1. **Michael Roberts,** "Fundamentals of Signals & Systems", 2nd edition, Tata McGraw-Hill, 2010, ISBN 978-0-07-070221-9.
2. **Alan V Oppenheim, Alan S Willsky and S Hamid Nawab,** "Signals and Systems" Pearson Education Asia / PHI, 2nd edition, 1997. Indian Reprint 2002.
3. **H.P Hsu, R. Ranjan,** "Signals and Systems", Schaum's outlines, TMH, 2006.
4. **B. P. Lathi,** "Linear Systems and Signals", Oxford University Press, 2005.
5. **Ganesh Rao and Satish Tunga,** "Signals and Systems", Pearson/ Sanguine.

D.V.

MICROCONTROLLER

Course Code : **18EC46**	CIE Marks 40
Lecture Hours/Week : 03	SEE Marks 60
Total Number of Lecture Hours : 40 (8 Hours / Module)	Exam Hours 03
CREDITS – 03	

Course Learning Objectives: This course will enable students to:

- Understand the difference between a Microprocessor and a Microcontroller and embedded microcontrollers.
- Familiarize the basic architecture of 8051 microcontroller.
- Program 8051microprocessor using Assembly Level Language and C.
- Understand the interrupt system of 8051 and the use of interrupts.
- Understand the operation and use of inbuilt Timers/Counters and Serial port of 8051.
- Interface 8051 to external memory and I/O devices using its I/O ports.

Module-1

8051 Microcontroller: Microprocessor vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

L1, L2

Module -2

8051 Instruction Set: Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples (without loops) to use these instructions.

L1, L2

Module-3

8051 Stack, I/O Port Interfacing and Programming: 8051 Stack, Stack and Subroutine instructions. Assembly language program examples on subroutine and involving loops.

Interfacing simple switch and LED to I/O ports to switch on/off LED with respect to switch status. **L1, L2, L3**

Module -4

8051 Timers and Serial Port: 8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode-2 on a port pin. 8051 Serial Communication- Basics of Serial Data Communication, RS-232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially. **L1, L2, L3**

Module -5

8051 Interrupts and Interfacing Applications: 8051 Interrupts. 8051 Assembly language programming to generate an external interrupt using a switch, 8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Stepper motor and their 8051 Assembly language interfacing programming.

L1, L2, L3

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

1. Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.
2. Write 8051 Assembly level programs using 8051 instruction set.
3. Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051.
4. Write 8051 Assembly language programs to generate square wave on 8051 I/O port pin using interrupt and C Programme to send & receive serial data using 8051 serial port.
5. Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Text Books:

1. "The 8051 Microcontroller and Embedded Systems – using assembly and C", Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2006 / Pearson, 2006.
2. "The 8051 Microcontroller", Kenneth J. Ayala, 3rd Edition, Thomson/ Cengage Learning.

Reference Books:

1. "The 8051 Microcontroller Based Embedded Systems", Manish K Patel, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. "Microcontrollers: Architecture, Programming, Interfacing and System Design", Raj Kamal, Pearson Education, 2005.

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

MICROCONTROLLER LABORATORY

Laboratory Code : **18ECL47**	CIE Marks : 40	SEE Marks : 60
Lecture Hours/Week : 02 Hours Tutorial (Instructions) + 02 Hours Laboratory		
RBT Levels : L1, L2, L3		Exam Hours : 03
CREDITS 02		

Course Learning Objectives: This laboratory course enables students to

- Understand the basics of microcontroller and its applications.
- Have in-depth knowledge of 8051 assembly language programming.
- Understand controlling the devices using C programming.
- The concepts of I/O interfacing for developing real time embedded systems.

Laboratory Experiments

I. PROGRAMMING

1. Data Transfer: Block Move, Exchange, Sorting, Finding largest element in an array.
2. Arithmetic Instructions - Addition/subtraction, multiplication and division, square, Cube – (16 bits Arithmetic operations – bit addressable).
3. Counters.
4. Boolean & Logical Instructions (Bit manipulations).
5. Conditional CALL & RETURN.
6. Code conversion: BCD – ASCII; ASCII – Decimal; Decimal - ASCII; HEX - Decimal and Decimal - HEX.
7. Programs to generate delay, Programs using serial port and on-Chip timer/counter.

II. INTERFACING

1. Interface a simple toggle switch to 8051 and write an ALP to generate an interrupt which switches on an LED (i) continuously as long as switch is on and (ii) only once for a small time when the switch is turned on.
2. Write a C program to (i) transmit and (ii) to receive a set of characters serially by interfacing 8051 to a terminal.
3. Write ALPs to generate waveforms using ADC interface.
4. Write ALP to interface an LCD display and to display a message on it.
5. Write ALP to interface a Stepper Motor to 8051 to rotate the motor.
6. Write ALP to interface ADC-0804 and convert an analog input connected to it.

Course Outcomes: On the completion of this laboratory course, the students will be able to:

1. Enhance programming skills using Assembly language and C.
2. Write Assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051.
3. Interface different input and output devices to 8051 and control them using Assembly language programs.
4. Interface the serial devices to 8051 and do the serial transfer using C programming.
5. Develop applications based on Microcontroller 8051.

Conduct of Practical Examination:

- All laboratory experiments are to be included for practical examination.
- Students are allowed to pick one experiment from the lot.
- Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
- Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

ANALOG CIRCUITS LABORATORY

Laboratory Code : **18ECL48**	CIE Marks : 40	SEE Marks : 60
Lecture Hours/Week : 02 Hours Tutorial (Instructions) + 02 Hours Laboratory		
RBT Levels : L1, L2, L3		Exam Hours : 03
CREDITS 02		

Course Learning Objectives: This laboratory course enables students to

- Understand the circuit configurations and connectivity of BJT and FET Amplifiers and Study of frequency response
- Design and test of analog circuits using OPAMPs
- Understand the feedback configurations of transistor and OPAMP circuits
- Use of circuit simulation for the analysis of electronic circuits.

Laboratory Experiments

PART A : Hardware Experiments

1. Design and setup the Common Source JFET/MOSFET amplifier and plot the frequency response.
2. Design and set up the BJT common emitter voltage amplifier with and without feedback and determine the gain- bandwidth product, input and output impedances.
3. Design and set-up BJT/FET i) Colpitts Oscillator and ii) Crystal Oscillator
4. Design active second order Butterworth low pass and high pass filters.
5. Design Adder, Integrator and Differentiator circuits using Op-Amp
6. Test a comparator circuit and design a Schmitt trigger for the given UTP and LTP values and obtain the hysteresis.
7. Design 4 bit R – 2R Op-Amp Digital to Analog Converter (i) using 4 bit binary input from toggle switches and (ii) by generating digital inputs using mod-16 counter.
8. Design Monostable and a stable Multivibrator using 555 Timer.

PART-B : Simulation using EDA software (EDWinXP, PSpice, MultiSim, Proteus, CircuitLab or any other equivalent tool can be used)

1. RC Phase shift oscillator and Hartley oscillator
2. Narrow Band-pass Filter and Narrow band-reject filter
3. Precision Half and full wave rectifier
4. Monostable and Astable Multivibrator using 555 Timer.

Course Outcomes: On the completion of this laboratory course, the students will be able to:

1. Analyze Frequency response of JFET/MOSFET amplifier.
2. Design BJT/FETs amplifier with and without feedback and evaluate their performance characteristics.
3. Apply the knowledge gained in the design of BJT/FET circuits in Oscillators.
4. Design analog circuits using OPAMPs for different applications.
5. Simulate and analyze analog circuits that uses ICs for different electronic applications.

Conduct of Practical Examination:

- All laboratory experiments are to be included for practical examination.
- Students are allowed to pick one experiment from the lot.
- Strictly follow the instructions as printed on the cover page of answer script for breakup of marks.
- Change of experiment is allowed only once and Marks allotted to the procedure part to be made zero.

Reference Books:

1. David A Bell, "Fundamentals of Electronic Devices and Circuits Lab Manual, 5th Edition, 2009, Oxford University Press.

D.V.T

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

ADDITIONAL MATHEMATICS – II

Course Code	: **18MATDIP41**	CIE Marks	: 40
Lecture Hours/Week (L:T:P),	: (2:1:0)	SEE Marks	: 60
Credits	: 0	Exam Hours	: 03

Course Learning Objectives:

- To provide essential concepts of linear algebra, second & higher order differential equations along with methods to solve them.
- To provide an insight into elementary probability theory and numerical methods.

Module-1

Linear Algebra: Introduction - rank of matrix by elementary row operations - Echelon form. Consistency of system of linear equations - Gauss elimination method. Eigen values and Eigen vectors of a square matrix. Problems.

Module-2

Numerical Methods: Finite differences. Interpolation/extrapolation using Newton's forward and backward difference formulae (Statements only)- problems. Solution of polynomial and transcendental equations – Newton-Raphson and Regula-Falsi methods (only formulae)- Illustrative examples. Numerical integration: Simpson's one third rule and Weddle's rule (without proof) Problems.

Module-3

Higher order ODEs: Linear differential equations of second and higher order equations with constant coefficients. Homogeneous /non-homogeneous equations. Inverse differential operators.*[Particular Integral restricted to* $R(x)=e^{ax}$, $\sin ax$ /$\cos ax$ *for* $f(D)y=R(x)$.]

Module-4

Partial Differential Equations (PDEs):- Formation of PDEs by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only.

Module-5

Probability: Introduction. Sample space and events. Axioms of probability. Addition & multiplication theorems. Conditional probability, Bayes' theorem, problems.

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

1. Solve systems of linear equations using matrix algebra.
2. Apply the knowledge of numerical methods in modelling and solving engineering problems.
3. Make use of analytical methods to solve higher order differential equations.
4. Classify partial differential equations and solve them by exact methods.
5. Apply elementary probability theory and solve related problems.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Textbook

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 43rd Edition, 2015

Reference Books

1. Advanced Engineering Mathematics, E. Kreyszig, John Wiley & Sons, 10th Edition, 2015
2. Engineering Mathematics, N. P. Bali and Manish Goyal, Laxmi Publishers, 7th Edition, 2007
3. Engineering Mathematics, Vol. I, Rohit Khurana, Cengage Learning, 1st Edition, 2015

H. O. D.
Dept. Of Electronics & Communication
Alva's Institute of Engg & Technology
Mijar, MOODBIDRI - 574 225