Government College of Engineering, Karad

(An Autonomous Institute of Government of Maharashtra)

Programme: Electronics and Telecommunication Engineering

Curriculum for
Second year of B. Tech

(Revised from A.Y. 2017-18)

Programme Educational Objectives (PEOs):

1. To motivate the students for pursuing higher education from renowned organizations, leading to Research & Development in core technical area.
2. To encourage students to participate in Social activities & utilize engineering knowledge to fulfil socio-ethical problems for Rural development & Regional needs of technology.
3. To prepare students with core Technical competency, Soft skills, Leadership quality & demonstrate an ability to work in multi-disciplinary fields.
4. To be able to acquire state of art knowledge to cater the Industry employability needs & to motivate students to enter in the field of Entrepreneurship.

Programme Outcomes (POs):

PO	Nomenclature	Definition (After successful completion of Electronics and Telecommunication Engineering program, student will able to:)
PO1	a	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	b	**Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	c	**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 considerations.
PO4	d	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	e	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	f	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	g	**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.
PO8	h	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	i	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	j	**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.
PO11	k	**Project management and finance:** Demonstrate knowledge and understanding

		of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	l	**Life-long 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.

Programme Specific Outcomes (PSOs):

PSO	Nomenclature	Definition
PSO1	m	A student should be able to demonstrate skills in analyzing and debugging any malfunctioning or errors of a pre-existing electronic/computer hardware or software systems for employability in core/IT sector.
PSO2	n	Design, Simulate and develop computer based prototype system for applications including Signal processing, Communication, Computer networks with free ware open source software platforms.

Government College of Engineering, Karad
Second Year B. Tech.
EX301: Engineering Mathematics - III

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : This course aims to:

1. Explain Mathematical methodologies and models, it is basic necessity for the foundation of Engineering and Technology
2. Develop mathematical skills and enhance logical thinking power of students.
3. Provide students with skills to solve differential equations and their applications which would enable students to obtain engineering solutions for given situations they may encounter in their profession.
4. Learn vector calculus, probability which would enable students to find engineering solutions for given situations they may encounter in their profession.

Course Contents		**Hours**
Unit I	**Linear Differential Equations (LDE) and Applications:** Linear Differential Equations with constant coefficients, Cauchy's and Legendre's differential equation, Applications of Linear Differential Equations with constant coefficients to Electrical systems.	8
Unit II	**Fourier Series:** Definition, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, expansions of odd and even periodic functions and half range series.	8
Unit III	**Fourier Transforms:** Fourier transforms, Fourier sine and cosine transforms, Complex form of Fourier Integral, Finite Fourier sine and cosine Transforms.	6
Unit IV	**Laplace Transform and Application:** Definition, properties of Laplace transforms, transforms of derivatives, Transforms of integral. Inverse Laplace transforms, Convolution theorem. Applications to initial value boundary problems, Heaviside Unit step function, Dirac-delta function, and Periodic function.	6
Unit V	**Vector Differential Calculus:** Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field.	8

Unit VI **Probability:** 6

Random Variable, Discrete and continuous random variable, Expected value of random variable, Variance, Moments & moment generating functions. Probability mass function & Probability density function, Probability distribution for random variables, Binomial, Poisson and Normal distributions.

Note:

- Tutorials for the subject shall be engaged in minimum of four batches (batch size of 20 students Maximum) per division.
- Teachers Assessment shall consist of minimum 8 tutorials from entire syllabus.

Course Outcome (CO) : Upon successful completion of this course, the student will be able to:

1 Understand the basic necessity of mathematics, for the foundation of Engineering and Technology. Also understand Mathematical methodologies and models.
2 Develop mathematical skills and enhance logical thinking power of students.
3 Solve problems on differential equations and their applications which would enable students to obtain engineering solutions for given situations they may encounter in their profession.
4 Understand vector calculus, probability which would enable students to find engineering solutions for given situations.

Text Books

1 Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, Wiley Eastern Ltd. Mumbai.
2 J. N. Wartikar & P. N. Wartikar, "A text book of Applied Mathematics: Vol. I, II and III", Vidyarthi Griha Prakashan, Pune.

Reference Books

1 B. S. Grewal, "Higher Engineering Mathematics", Khanna Publication, New Delhi.
2 S. D. Sharma, "Operations Research".
3 Kanti B. Datta, Cengage Learning, "Mathematical Methods of Science and Engineering (Aided with MATLAB)".

Useful Links

1 http://nptel.ac.in/courses/122103012/
2 www.ocw.mit.edu/courses/most-visited-courses/
3 https://www.khanacademy.org/math/differential-equations
4 https://www.khanacademy.org/math/probability

Mapping of CO and PO

	PO												PSO	
	a	B	C	d	e	F	g	H	i	j	k	l	m	n
CO1	√	√			√				√		√	√	√	
CO2	√	√	√	√					√		√	√	√	
CO3	√	√							√					
CO4	√	√	√						√		√	√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember			2.5	15
Understand	5	5	2.5	10
Apply	5	5	2.5	15
Analyse				10
Evaluate	5	5	2.5	10
Create				
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech.
EX302: Electronic Devices and Circuits

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : This course aims to:

1. Provide an introduction and basic understanding of Semiconductor Devices viz. diodes and bipolar junction transistors.
2. Understand the different types of transistor with analysis.
3. Analyse effect of frequency on amplifiers.
4. Design electronic circuits to meet the desired specifications.

Course Contents		**Hours**
Unit I	**Semiconductors and Diode theory:** Drift and diffusion mechanisms, Recombination process, Mean carrier lifetime, Conductivity, Mobility, Mass action law, Einstein relationship. Semiconductor p-n junction, Depletion region, Barrier potential, V-I characteristic, Equation of diode. Forward and reverse dynamic resistance, Diode Capacitances. Diode Applications – Rectifiers, Clippers & Clampers	7
Unit II	**Bipolar Junction Transistor:** BJT biasing, concept of dc and ac load line, bias stabilization, thermal runaway, thermal stabilization, Early effect, Small signal low frequency h-parameter model. Introduction to amplifier**,** Derivations for CE configuration for AI, Ri, Ro, Avs, AIS in terms of h-parameters, and Detailed study of Single stage RC coupled amplifier & Emitter follower.	7
Unit III	**Field Effect Transistor:** JFET, MOSFET (depletion and enhancement) - construction , V-I characteristics, transfer characteristics, voltage-current relationship, Cut-off & Pinch-off voltages, Transconductance , channel length modulation, Input resistance & Capacitance and various breakdown in FET. FET small signal model, FET biasing – self and voltage divider biasing, CMOS introduction.	7
Unit IV	**Frequency Response analysis:** Concept of frequency response. Effect of coupling, bypass, junction and stray capacitances on frequency response of FET amplifiers. Millers Theorem. High frequency response: Hybrid π model. Gain bandwidth product	7

Unit V **Power Amplifiers:** 7

Power transistors; Power amplifiers; Classes of amplifiers: class-A, class-B power amplifiers, Class-AB push-pull complementary output stages.

Unit VI **Rectifiers and Power Supplies**: 7

Different types of Rectifiers and related parameters. Inductor filter, Capacitor filter, L filter, π filter. Need of voltage regulator, Stabilization factors, Analysis & Design of Shunt regulator (using Zener diode & BJT), series voltage regulator (using BJT) Series voltage regulator with Pre- regulator & Overload protection circuit.

Course Outcome (CO) : Upon successful completion of this course, the student will be able to:

1. Apply knowledge of mathematics, science, and engineering to design, analyse and operation of electronic devices and circuits
2. Explain basic analog electronic circuit design techniques using diodes and bipolar junction transistors.
3. Explain the hybrid model of transistor and analyse the transistor amplifier (CE, CB, CC) using h-parameters.
4. Determine the frequency response of amplifiers
5. Analyse and design electronic circuits such as rectifiers, voltage regulators and transistorized amplifiers

Text Books

1. J. Millman & C.Halkias, “Electronic devices & circuits”, Tata McGraw Hill Publication.
2. Allen Mottershed, “Electronic devices & circuits”, Prentice- Hall India.

Reference Books

1. David A. Bell, “Electronic devices & circuits”, Oxford University.
2. Robert L. Boylestad, Louis Nashelsky, “Electronic Devices and Circuit Theory”, PHI publishers.
3. Sedra/Smith, “Microelectronic Circuits” by, Oxford University Press.

Useful Links

1. http://www.electronics-tutorials.ws/
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science
3. http://nptel.ac.in/video.php?subjectId=117103063
4. http://nptel.ac.in/courses/117107094/

Mapping of CO and PO

	PO												PSO	
	a	b	C	d	e	f	g	h	i	j	k	l	m	n
CO1	√		√							√	√	√		√
CO2	√	√	√	√						√	√	√		
CO3	√		√	√							√			
CO4	√			√						√	√			
CO5	√		√							√		√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	2	10
Understand	5		2	10
Apply	5	5	2	10
Analyse		5	2	10
Evaluate			2	10
Create				10
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech.
EX303: Microcontroller and Interfacing

Teaching Scheme		**Examination Scheme**	
Lectures	4 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : This course aims to

1. Provide an overview of difference between microprocessor and micro controller.
2. Give an understanding about the concepts and basic architecture of 8051.
3. Study the architecture and addressing modes of 8051.
4. Impart knowledge about assembly language programs of 8051.
5. Help understand the importance of different peripheral devices & their interfacing to 8051.
6. Impart knowledge of different types of external interfaces including LEDS, LCD, Keypad Matrix, Switches & Seven segment display.

Course Contents		**Hours**
Unit I	**Introduction to 8085 microprocessors:** Introduction, Block diagram of 8085, machine cycle, Instruction cycle, Timing Diagram Types of Instructions and examples. Difference between microprocessor and microcontroller, memory organization in 8085, Assembly language programming.	6
Unit II	**Basics of 8051 Microcontrollers:** Introduction to various Architectures, Concept of RISC and CISC processors. Microcontrollers and embedded processors, Overview of the 8051 family, Architecture of 8051, Pin description, RAM and Rom Organization in 8051	5
Unit III	**8051 Assembly Language Programming:** 8051 Addressing Modes: Immediate and register addressing modes, accessing memory using various addressing modes, Bit addresses for I/O and RAM, Extra 128-byte on-chip RAM in 8052.Concept of Instruction cycle, Machine cycle. Types of Instructions, Introduction to 8051 assembly programming, Assembling and running an 8051 program, the program counter and ROM space in the 8051, 8051 data types and directives, 8051 flag bits and the PSW register, 8051 register banks and stack. Jump, Loop, And Call Instructions. I/O Port Programming. Arithmetic and Logic Instructions and Programs.	8
Unit IV	**8051 Programming in C:** Data types and time delay in 8051 C, I/O programming in 8051 C, Logic operations in8051 C, Data conversion programs in 8051 C, accessing code ROM space in 8051 C, Data serialization using 8051 C. 8051 Hardware Connection and Intel Hex File	4

Unit V	**8051 Timer Programming in Assembly and C:** Programming 8051 timers, counter programming, Programming timers 0 and 1 in 8051 C as well as in assembly.	4
Unit VI	**8051 Serial Port Programming in Assembly and C:** Basics of serial communication, 8051 connection to RS232, 8051 serial port programming in Assembly, Programming the second serial port, Serial port programming in C.	4
Unit VII	**Interrupts Programming in Assembly and C:** 8051 interrupts programming, Timer interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in the 8051/52, Interrupt programming in C.	6
Unit VIII	**Interfacings of 8051:** Details of LCD interfacing, Keyboard interfacing. Parallel and serial ADC, DAC interfacing, Sensor interfacing and signal conditioning. Semiconductor memory, Memory address decoding, 8031/51 interfacing with external ROM, Flash RAM, 8051 data memory space, Accessing external data memory in8051 C.RTC Interfacing and Programming. Motor Control: Relay, PWM, DC and Stepper Motors PWM.	6

Course Outcome (CO) : Upon successful completion of this course, the student will be able to:

1 Explain the difference between microprocessor and microcontroller
2 Explain different addressing modes of 8051
3 Explain the working of various peripherals and their interfacing
4 Write assembly as well as c programs for 8051
5 Design system based on 8051

Text Books

1 Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin McKinlay, “The 8051 Microcontroller and Embedded Systems Using Assembly and C”, Second Edition, Pearson Education.
2 K. J. Ayala, D. V. Gadre, “The 8051 Microcontroller & Embedded Systems using Assembly and C”, Cengage Learning, India Edition.

Reference Books

1 Satish Shah, “8051 Microcontrollers: MCS51 family and its variants”, Oxford University Press.
2 Subrata Ghoshal, “8051 Microcontroller: Internals, Instructions, Programming and Interfacing”, Pearson Education.
3 K Uma Rao, Andhe Pallavi, “The 8051 Microcontrollers: Architecture, Programming and Applications”, Pearson Education.

Useful Links

1 http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/microcontrollers/ micro/ui/TOC.htm
2 http://freevideolectures.com/Course/3018/Microprocessors-and-Microcontrollers

Mapping of CO and PO

	PO												PSO	
	a	B	c	d	e	f	g	h	i	j	k	l	m	n
CO1														
CO2		√	√	√							√			
CO3		√	√								√			
CO4	√	√	√								√			
CO5			√								√			

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	2	10
Understand	5	5	2	20
Apply	5	5	2	10
Analyse			2	10
Evaluate			2	10
Create	-	-	-	-
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech.
EX304: Digital Electronics

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : This course aims to

1. Understand principles, characteristics and operations of combinational & sequential logic circuits.
2. Design combinational circuits by using logic gates
3. Explain Boolean algebra and the various methods of Boolean function reduction, K-map reduction and Quine McCluskey method
4. Design, implement and analyze, asynchronous and synchronous sequential circuits (FSM) using flip flops.
5. Explain the various 74XX series components and their applications in designing combinational & low complexity sequential circuits.

Course Contents **Hours**

Unit I **Logic Families:** 6

Logic Families – Significance and Types, Characteristic Parameters, Transistor Transistor Logic (TTL), Emitter Coupled Logic (ECL), NMOS and PMOS Logic, CMOS Logic Family, Comparison of Different Logic Families.

Unit II **Minimization Techniques and Logic Gates:** 8

Minimization Techniques: Boolean postulates and laws – De Morgan's Theorem Principle of Duality Boolean expression Minimization of Boolean expressions – Minterm – Maxterm Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map

Minimization – Don't care conditions – Quine Mc Cluskey method of minimization. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND–NOR implementations – Multilevel gate implementations, TTL and CMOS Logic and their characteristics – Tristate gates

Unit III **Combinational Circuits:** 6

Design procedure – Half adder, Full Adder, Half Subtractor, Full Subtractor, Parallel binary adder, parallel binary Subtractor, Fast Adder Carry Look Ahead adder, Serial Adder/Subtractor BCD adder – Binary Multiplier – Binary Divider Multiplexer/Demultiplexer – decoder encoder – parity checker – parity generators – code converters Magnitude Comparators.

Unit IV **Sequential Circuits:** 8

Latches, Flip flops- SR, JK, D, T, and Master Slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering.

Realization of one flip flop using other flip flops – serial adder/Subtractor Asynchronous Ripple or serial counter – Asynchronous Up/Down counter Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram State table –State minimization – State assignment Excitation table and maps Circuit implementation Modulo– n counter, Registers – shift registers Universal shift registers – Shift register counters – Ring counter – Shift counters Sequence generators.

Unit V **Memory Devices:** 7

Classification of memories – ROM, ROM organization, PROM –EPROM – EEPROM –EAPROM, RAM – RAM organization – Write operation – Read operation.

Programmable Logic Devices – Programmable Logic Array (PLA) Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA), ASIC, Implementation of combinational logic circuits using ROM, PLA, PAL

Unit VI **State Machines:** 7

FSM, Moore/Mealy machines, representation techniques, state diagram, state table, state assignment and state reduction, implementation using D flip flop, Application like sequence detector, binary adder etc., Effect of clock skew and clock jitter on synchronous designs (Meta stability), Introduction to ASM

Note:

- Tutorials for the subject shall be engaged in minimum of four batches (batch size of 20 students Maximum) per division.
- Teachers Assessment shall consist of minimum 8 tutorials from entire syllabus.

Course Outcome (CO) : Upon successful completion of this course, the student will be able to:

1 Apply Boolean laws/K-Map/Quine McCluskey method to reduce Boolean functions and design combinational logic circuits using logic gates
2 Demonstrate the operation of flip-flops, counters and shift registers
3 Design Synchronous sequential machine using Moore and Mealy machine
4 Distinguish between various memories and implementation of digital circuits using PLA and PAL
5 Demonstrate logical skills, debugging skills in designing small digital circuits for industrial applications

Text Books

1 R.P. Jain, “Modern Digital Electronics”, 4th edition, Tata McGraw - Hill Education, 2010.
2 Primer , J. Bhasker, “A VHDL”, 3rd edition, PHI Learning, 2009
3 M. Morris Mano, “Digital Design”, Pearson Education (3rd Edition) (Unit 1,2,3,4)

Reference Books

1 William I. Fletcher, “An Engineering Approach to Digital Design”, PHI/ Pearson.
2 Anil K. Maini, “Digital Electronics principles and Integrated Circuits”, Wiley Publications.

3 A. Anand Kumar, “Fundamentals of digital circuits”, 1st edition, PHI publication, 2001.

Useful Links

1 https://en.wikibooks.org/wiki/Digital_Electronics
2 www.asic-world.com
3 www.electronics-tutorials.com
4 http://nptel.ac.in/courses/117106086/
5 http://10.0.0.208/NPTEL%20Videos/ELETRONICS%20&%20ELECTRICAL%20ENGG/digitalintegratedcircuits

Mapping of CO and PO

	PO												PSO	
	a	B	c	d	E	f	g	h	i	j	k	l	m	n
CO1	√	√	√					√		√	√	√		√
CO2	√									√	√		√	√
CO3	√	√	√		√			√		√	√	√		
CO4	√	√			√			√		√	√			√
CO5	√	√	√	√	√		√	√	√	√	√	√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	5		2	10
Understand	5	5	2	10
Apply		5	2	10
Analyse	5	5	2	10
Evaluate			2	10
Create				10
Total	15	15	10	60

Government College of Engineering Karad
Second Year B. Tech.
EX305: Transducers and Measurements

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : The course aims to

1 Explain students the fundamental concepts of measurement.
2 Make students aware of various electronic measuring instruments.
3 Provide students an understanding of measurement using Bridge circuits.
4 Explain students the concepts transducers and sensors.
5 Make students able to understand and perform signal conditioning operations.

Course Contents **Hours**

Unit I **Measurement fundamentals:** 06

Introduction to measurement , Performance Characteristics, Static Characteristics, Error in Measurement, Types of Static Error, Sources of Error, Dynamic Characteristics, Statistical Analysis, Graphical Representation of Measurements as a Distribution

Unit II **Measuring devices:** 08

CRO, Digital storage oscilloscope, Function generators, Digital voltmeters(DVM), digital multimeters, Signal Generators, Spectrum analyzer, logic analyzer, digital frequency meter, Q-meter, LED, LCD, Graphics Display

Unit III **AC and DC Bridges:** 06

Need of Bridges, Measurement of Resistance, inductance, capacitance, frequency and Q of coil with Bridges, : Wheatstone's Bridge, Kelvin Double Bridge, AC Bridges such as Haye's Bridge, Wein Bridge, Maxwell's-Wein Bridge, Maxwell' L/C Bridge, Descourty's Bridge & Schering Bridge

Unit IV **Transducers and Sensors :** 10

Definition of transducers and study of following transducers: (i) Position and motion (ii) Strain, Force, Pressure and Flow (iii) Temperature (iv) Sound Transducer (v) Digital Transducers (vi) Proximity Devices (vii) optical Sensors (viii) Smart Sensors

Unit V **Data acquisition and Signal Conditioning techniques :** 06

Elements of data acquisition system, AC to DC conversion, amplification, OP-AMP and instrumentation amplifier, programmable gain amplifier, theory of active filters, modulators and demodulators, attenuators, comparators, ADC and DAC, introduction to Digital Signal Processing and its applications

Course Outcome (CO) : Upon successful completion of this course, the student will be able to:

1 Understand the basic concepts and need of measurement.
2 Use various transducers and sensors for measurement purpose.
3 Understand the fundamentals and design of signal conditioning circuits.
4 Use and design of Bridge circuits for measurements of various parameters like resistance, inductance, capacitance and frequency and understand its importance in measurement.

Text Books

1 A.K.Sawhney, "A course in Electrical, Electronics measurement and Instrumentation", Danpat Rai Publication.
2 H. S. Kalsi, "Electronic Instrumentation", MGH, 3rd Edition.
3 S. Tumanski, "Principles of electronic measurement", Taylor and Francis Publication.
4 Rohit Khurana, "Electronic Instrumentation and Measurement", first edition, Vikas Publication.

References

1 Welfrick Cooper, "Electronic Instrumentation and Measurement Techniques", PHI Publication.
2 John Turner, "Instrumentation for Engineers And Scientists" , II Edition , Wiley.
3 David A Bell, "Electronic Instrumentation and Measurements", Third Edition, Oxford.
4 James W Dally, "Instrumentation for Engineering Measurements", II Edition, Wiley.

Useful Links

1 www.analogcircuits.com
2 NPTEL- Mechatronics and Manufacturing automation

Mapping of CO and PO

	PO												PSO	
	a	B	c	d	e	f	g	h	i	j	k	l	m	n
CO1	√	√	√	√	√				√		√	√	√	√
CO2	√	√	√	√	√				√		√	√	√	√
CO3	√	√	√	√	√				√		√	√	√	√
CO4	√	√	√	√	√				√		√	√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	5		2	10
Understand	5	5	2	10
Apply		5	2	10
Analyse	5	5	2	10
Evaluate			2	10
Create				10
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech.
EX306: Electronic Devices and Circuits Lab

Laboratory Scheme		Examination Scheme	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25

Course Objectives : This course aims to

1. Understand how to use breadboard and mounting of active / passive components on breadboard.
2. Understand the various diode application circuits with detail analysis.
3. Understand the configurations of transistor with their frequency response.
4. Understand the build and testing of different types of voltage regulator.

Course Contents

Experiment 1	Design and analysis of full wave rectifier using filters.
Experiment 2	Study of different types of clipper circuits.
Experiment 3	Study of different types of clamping circuits.
Experiment 4	Design and study of Low pass filter
Experiment 5	Design and study of High pass filter.
Experiment 6	Design and analysis of common emitter amplifier and FET amplifier.
Experiment 7	Design and analysis of zener shunt regulator
Experiment 8	Design and analysis of series pass voltage regulator.
Experiment 9	Design and analysis of transistorized shunt regulator.
Experiment 10	Determination of H-parameter for CE configuration using input and output characteristics.

List of Submission

1. Total number of Experiments: 10
2. Total number of sheets: NA
3. Project/Dissertation Report: NA
4. Seminar report: NA
5. Field Visit Report: NA

Additional Information

Course Outcome(CO) : Upon successful completion of this course, the student will be able to

1. Handle various electronic devices, instruments and circuits as well as Bread board and routing on breadboard.
2. Design and test diode related circuits on breadboard and measurement of their parameters.
3. Build and implement various type of regulators
4. Design BJT and FET amplifiers.

Mapping of CO and PO

	PO												PSO	
	a	B	c	d	e	f	g	h	i	j	k	l	m	n
CO1			√							√	√			
CO2	√		√							√	√		√	
CO3	√		√	√	√					√	√			
CO4	√		√	√	√						√	√	√	√

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	TA	ESE
Assembling												
Testing	√	√	√	√	√	√	√	√			√	√
Observing	√	√	√	√	√	√	√	√	√	√	√	√
Analysing	√		√						√	√	√	√
Interpreting									√	√	√	√
Designing	√	√	√	√	√	√	√	√			√	√
Creating												√
Deducing conclusions	√	√	√	√	√	√	√	√	√	√	√	√
Total	10	10	10	10	10	10	10	10	10	10	25	25

Government College of Engineering, Karad
Second Year B. Tech.
EX307 :Microcontroller and Interfacing Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25

Course Objectives : This course aims to

1. Understand the Assembly language programming for 8051
2. Understand the various peripheral devices and their interfacing
3. Understand the programming and virtual simulation of system designed in PROTEUS
4. Understand the working of various inbuilt modules like Timers, counters, Interrupts, etc.

Course Contents

Experiment 1	a) Write a program to add two 8-bit numbers stored in registers or internal/External memory locations. b) Write a program to multiply two 8-bit numbers stored in registers or internal/External memory locations. c) Write a program to multiply two 16-bit numbers.
Experiment 2	a) Write a program to add block of data stored in internal/external memory locations. b) Write a program to transfer block of data from internal memory locations to external memory locations. c) Write a program to sort block of data in ascending or descending order.
Experiment 3	a) Write a program to perform the following. 1. Keep monitoring P1.2 until it becomes high. 2. When P1.2 becomes high write value 45H on P0. 3. Sent a high to low pulse to P2.3 b) A switch is connected to P1.7. Write a program to check the status of switch and perform the following. 1. if switch = 0, send letter “N” to P2 2. if switch = 1, send letter “Y” to P2.
Experiment 4	a) Write a program to generate 5 KHz pulse waveform of 50% duty cycle on pin 1.0 using timer 1 in mode 2. b) Write a program to generate 1 KHz pulse waveform of 70% duty cycle on pin 1.0 using timer.
Experiment 5	a) Write a program for the 8051 to transfer letter “A” serially, continuously. b) Write a program to transfer the message “YES” serially. Do this continuously. c) Program the 8051 to receive bytes of data serially, and put them in P1.
Experiment 6	Interfacing ADC and DAC.
Experiment 7	Interfacing Matrix Keyboard.
Experiment 8	Interfacing LED and LCD Displays.
Experiment 9	Interfacing Stepper Motor.
Experiment 10	Controlling DC motor using PWM.

List of Submission

1 Total number of Experiments:10
2 Total number of sheets: NA
3 Project/Dissertation Report: NA
4 Seminar report: NA
5 Field Visit Report: NA

Additional Information

Course Outcome : Upon successful completion of this course, the student will be able to

1 Write assembly as well as c programs for microcontroller
2 Design delays using timers in 8051
3 Interface ADC,DAC, LCD, LED, Keyboard, Stepper motor, DC motor etc. with 8051
4 Differentiate between microprocessor and microcontroller

Mapping of CO and PO

	PO												PSO	
	a	B	c	d	e	f	g	h	i	j	k	l	m	n
CO1	√	√	√							√	√			
CO2	√	√	√							√	√			
CO3		√	√	√							√			
CO4											√			

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	TA	ESE
Assembling												
Testing												
Observing	√	√	√	√	√	√	√	√	√	√	√	√
Analysing	√	√				√	√		√		√	√
Interpreting		√	√						√	√	√	√
Designing	√	√	√	√	√	√	√	√	√		√	√
Creating											√	√
Deducing conclusions	√	√	√	√	√	√	√	√	√		√	√
Total	10	10	10	10	10	10	10	10	10	10	25	25

Government College of Engineering, Karad
Second Year B. Tech.
EX308: Digital Electronics Lab

Laboratory Scheme		Examination Scheme	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	25

Course Objectives : This course aims to

1. Understand principles, characteristics and operations of combinational & sequential logic circuits.
2. Design combinational circuits by using logic gates
3. Explain Boolean algebra and the various methods of Boolean function reduction, K-map reduction and Quine McCluskey method
4. Design, implement and analyse, asynchronous and synchronous sequential circuits (FSM) using flip flops.
5. Explain the various 74XX series components and their applications in designing combinational & low complexity sequential circuits.

Course Contents

Experiment 1	Realization of logic gates OR, AND, NOT, NOR, NAND gates using IC's/ discrete components and verify their truth tables using timing diagram
Experiment 2	Design code convertors (Any two)
Experiment 3	Prototyping of source to destination communication using MUX (IC 74151) and DEMUX(IC 74138)
Experiment 4	Realization of IC7483 as parallel adder and substractor
Experiment 5	Design and build 4-bit, 5-bit & 8-bit comparator using IC 7485
Experiment 6	Realization of all modes of universal shift register using IC IC 7495
Experiment 7	Design and build 4 bit comparator using IC 74181
Experiment 8	Implement and evaluate using oscilloscope Mod-N counter (IC 7490)
Experiment 9	Design, implement and test 4 bit sequence detector using IC 7474
Experiment 10	Design ring and Johnson counter using flip-flops
Experiment 11	Design 4-bit UP/DOWN synchronous counter using IC
Experiment 12	Mini project based on digital circuits on breadboard/ PCB

List of Submission

1. Total number of Experiments :10
2. Total number of sheets:00
3. Project Report of mini project:01

Additional Information

Course Outcome : Upon successful completion of this course, the student will be able to

1. Designing combinational logic circuits using logic gates
2. Designing sequential logic circuits using flip-flop ICs
3. Demonstrate logical skills, debugging skills in designing small digital circuits

Mapping of CO and PO

	PO												PSO	
	a	B	c	d	e	f	g	h	i	j	k	l	m	n
CO1	√	√	√					√		√	√			√
CO2	√	√	√					√		√	√			√
CO3	√	√	√	√	√		√	√	√	√	√	√	√	√

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	TA	ESE
Assembling	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Testing	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Observing	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Analysing	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Interpreting	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Designing		√			√		√		√	√	√	√	√	√
Creating												√	√	√
Deducing conclusion	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Total	10	10	10	10	10	10	10	10	10	10	10	10	25	25

Government College of Engineering Karad
Second Year B. Tech,
EX309: Embedded C Lab

Teaching Scheme		Examination Scheme	
Tutorial	1 Hr/week	**CA**	50
Practical	2 Hrs/week	**ESE**	--
Total Credits	2		

Course Objectives : The course aims to

1. Learn fundamentals of C, forming the programming platform.
2. Provide an introduction and basic understanding of Types of Memory data Allocations i.e. Data Structures with basic Programming Knowledge.
3. Practice programs on 8051 simulator and hardware kit via Embedded C Programming.

Course Contents		Hours
Module I	**Introduction & Overview:** Introduction to theory of C Programming. Introduction to Turbo C and Code::Blocks software.	1
Module II	**Arrays:** Introduction, linear arrays, representation of linear array in memory, traversing linear arrays, inserting & deleting, Multidimensional arrays.	1
Module III	**Sorting and Searching:** Sorting: bubble sort, selection sort, insertion sort. Searching: linear search, binary search.	
Module IV	**Pointers:** Pointers: pointer arrays.	1
Module V	**Records:** Records: Record structures, representation of records in memory, parallel arrays, matrices, space matrices.	1
Module VI	**Stacks and Queues:** Introduction to stacks, stack as an Abstract Data type, Operations on Stacks, Applications. Queue as an abstract data type, operations, representation, circular, double ended, priority, applications.	1
Module VII	**Embedded 'C' Programming for 8051:** Introduction to Embedded C Programming using Keil µVision IDE. Key words, memory models, memory types, data types, bit types, pointers.	1
Module VIII	**Embedded 'C' Programming for 8051:** Functions interrupt functions, re-entrant functions.	1

Module IX	**Embedded 'C' Programming for 8051:** Time delay, I/O Programming	1
Module X	**Embedded 'C' Programming for 8051:** Logic operations, Data conversions	1
Module XI	**Embedded 'C' Programming for 8051:** accessing code ROM space	1
Module XII	**Embedded 'C' Programming for 8051:** Data serialization	1

Lab Course Contents

(Note: Instructor can conduct any 5 Experiments from 1-7 and any 5 experiments from 8-14.)

Experiment 1	Introduction to C Programming: Any three basic C programs. (Two programmes should be given for practice and last problem of session should be given for students for algorithm development and implementing the same in C. The same problem should be in the lab file of students. The three programmes may be different for every batch.)
Experiment 2	Array Handling - Traversing an Array, Insertion and Deletion of an element in an Array.
Experiment 3	Sorting Techniques for Arrays - Bubble sort, Selection Sort, Insertion Sort.
Experiment 4	Searching Techniques for Arrays - Linear Search, Binary Search.
Experiment 5	Multi-dimensional Array Handling – To Scan and Display a 2D Array.
Experiment 6	Implementation of Stack using Array.
Experiment 7	Implementation of Queue using Array.
Experiment 8	Arithmetic& Logical operations using 8085 using Embedded C
Experiment 9	Data transfer & Exchange using 8085 using Embedded C
Experiment 10	Data conversions using 8085 using Embedded C
Experiment 11	Timer & counter operation in 8051 using Embedded C
Experiment 12	Interface LCD to 8051 using Embedded C
Experiment 13	Serial Communication with 8051 using Embedded C
Experiment 14	Interface Stepper motor using 8051 using Embedded C

List of Submission

1 Total number of Experiments = 10 (Any 5 from 1-7 and any 5 from 8-14.)
2 Total number of sheets = Not Applicable
3 Project/Dissertation Report = Not Applicable
4 Seminar report = Not Applicable
5 Field Visit Report = Not Applicable

Course Outcomes (CO) : Upon successful completion of this course, the student will be able to

1 Apply knowledge of Programming in the Fields of C Programming as well as in Microcontrollers.
2 Understand the basic programming concepts of C.
3 Develop Logic to Design an algorithm for C as well as Microcontroller Programming.

Text Books

1 V. Kanetkar, “Let us C”, BPB Publication.
2 G. S. Baluja, “Data Structures using C”, Dhanpat Rai Publication.
3 C51 compiler user guide By Keil software.

References

1 Mark Allen Weiss, “Data structure & algorithm analysis in C”, Pearson Education.
2 Muhammad Ali Mazidi & Janice Gillispie Mazidi, “The 8051 Microcontroller & Embedded Systems”, Pearson Edition L. P .E.
3 Kenneth L Short, “Microprocessors and Programmed logic”, Prentice-Hall.
4 Douglas V Hall, “Microprocessors and Digital Systems”, McGraw-Hill, 1980.
5 Kenneth C Ayala, “The 8051 Microcontroller”, 3rd Edition, Pearson Education.

Useful Links

1 http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/microcontrollers/micro/ui/Course_home2_5.htm
2 http://nptel.ac.in/courses/106103069/

Mapping of CO and PO

	PO												PSO	
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
CO1	√	√	√	√							√	√	√	√
CO2	√	√	√	√							√	√	√	√
CO3	√	√	√	√							√	√	√	√
CO4	√	√	√	√							√	√	√	√

Assessment Pattern

Skill Level	Experiments														TA
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Assembling															
Testing	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Observing	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Analysing															
Interpreting	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Designing	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Creating															
Deducing conclusions	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	10	10	10	10	10	10	10	10	10	10	10	10	10	10	50

Government College of Engineering, Karad
Second Year B. Tech.
EX401: Analog Integrated Circuits

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorials	--	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : This course aims to

1 Understand the different type of feedback amplifiers.
2 Understand the multistage amplifier, configurations of differential amplifiers (DC & AC).
3 Understand the electrical parameters of Op-Amp.
4 Understand the design of various applications of Op-Amp.
5 Understand the signal generators and multivibrators.

Course Contents		**Hours**
Unit I	**Feedback Amplifier :** Classification of amplifiers, Feedback concept, Transfer gain with feedback, General characteristics of negative feedback amplifier, Input and output resistance, Voltage - series, current - series, voltage – shunt, current shunt amplifiers. Darlington Emitter follower.	6
Unit II	**Multistage and Differential Amplifiers:** Cascaded amplifier, cascade amplifier, multistage RC coupled amplifier. Differential Amplifier: configurations, DC analysis, AC analysis using r parameter (Dual Input Balanced output & Dual Input Unbalanced Output), Current mirror circuits.	6
Unit III	**Basics Op-Amp:** Definition, symbol, Block diagram of OP-AMP, Ideal parameters and practical parameters of OP-AMP and their comparison, Virtual ground concept, Open loop configuration, closed loop configuration(Inverting and Non Inverting), unity gain amplifier. Introduction to IC 741.	6
Unit IV	**Applications of Op-amp:** Summing, Scaling & Averaging Amplifiers using Op-amps, Instrumentation amplifier, V to I & I to V Converter, Precision Rectifiers, Log & Anti-log Amplifiers, comparator, Schmitt Trigger, Window Detector, Clippers & Clampers, V to F and F to V convertor, Peak Detectors and Sample & Hold Circuits. Introduction to PLL.	6
Unit V	**Active Filters and Waveform Generator:** High Pass filter, Low Pass filter (First & Second order), Band Pass filter, Band Reject filter, All Pass filter. Square wave generator, Triangular wave generator, Saw tooth wave generator (Design & Analysis using Op-Amp).	6

Unit VI **Oscillators and Multivibrators:** Use of positive feedback, Barkhausen criterion for oscillations, Different oscillator circuits: Hartley, Colpitts, phase shift and Wien's bridge (Using Op-Amp). Basics of IC 555, Multi-vibrator using IC 555 (Monostable, Bistable and Astable). 6

Course Outcome (CO) : Upon successful completion of this course, the student will be able to

1 Design and explain feedback amplifiers.
2 Analyse and design electronic circuits such as wave shaping circuits, multistage amplifiers and differential amplifier.
3 Explain basics of op-amp.
4 Explain the working of various circuits for different applications designed using IC 741, IC555.
5 Solve problem related to op-amp.

Text Books

1 Jacob Millman, "Integrated Electronics", Mc Graw Hill second Edition.
2 Ramakant A. Gayakwad, "Op-Amp and Linear Integrated Circuits", Pearson Education.

Reference Books

1 Robert L. Boylsted, Louis Nashelsky, "Electronic devices & circuit theory", Pearson Education
2 Sedra smith, "Microelectronics Circuits", Oxford International student edition.
3 Robert Coughlin, Fredric Driscoll, "Operational Amplifiers and Linear Integrated", Sixth edition, PE.
4 D. Roy Choudhury, "Linear Integrated Circuits", New Age International Ltd.

Useful Links

1 http://nptel.ac.in/courses/117106030/
2 www.allaboutcircuits.com
3 www.electronics-tutorials.ws

Mapping of CO and PO

	PO												PSO	
	a	b	c	d	e	f	g	h	i	j	k	l	m	N
CO1	√		√		√					√	√	√		√
CO2	√		√							√	√	√		√
CO3	√		√		√						√	√	√	
CO4	√		√	√	√						√			√
CO5	√		√							√				√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	4	2	10
Understand	5	4	2	10
Apply		2	2	10
Analyse		2	2	10
Evaluate	5	3	2	10
Create				10
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech
EX402 : Network Analysis

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorials	--	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : This course aims to

1. Understand use of circuit analysis methods and theorems
2. Understand basic concepts of D.C. and A.C. Circuit behaviour
3. Evaluate two port network parameters
4. Demonstrate series and parallel resonance and its effects
5. Develop and Solve mathematical representations for linear circuits

Course Contents		**Hours**
Unit I	**Network Fundamentals**: Basic Definitions: Passive Network, Active Network, Linear Element, nonlinear elements, Unilateral, bilateral, lumped & distributed elements. Representation of voltage & current sources (Ideal & practical), source transformation, series & parallel connection of passive elements(R,L,C), Energy and Power computation, graph of network & its parts, loops & trees, linear graphs & incidence matrix, cutsets, planner & non-planner graph loop matrix. Star- Delta transformation, reduction of networks: Mesh analysis, Node analysis. Supermesh and supernode analysis.	8
Unit II	**Network Theorems**: A. C. Analysis – Average value, R.M.S. value, Power, active power, reactive power, complex power, power factor, D.C. and A.C. network solution using dependent and independent sources: Superposition Theorem, Millman's Theorem, Norton's Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Duality theorem, Tellegen's Theorem.	8
Unit III	**Two port networks and network functions**: Two port network: Open circuit impedance (Z) parameters, Short circuit admittance (Y) parameters, Hybrid (H) parameter, Transmission parameters(ABCD), Interrelation of different parameters, Interconnections of two port network (Series, Parallel, Cascaded, Series- Parallel) Network Functions: Network functions for one port & two port networks, Driving point impedance and admittance of one port network, Driving point impedance, admittance & different transfer function of two port network (Z, Y, H & T parameters). Concept of complex frequency, significance of poles & zeros. Restrictions on poles & zeros for transfer & drawing points function, stability concept in passive circuit using Routh- Hurwitz criterion, pole zero diagram.	8

Unit IV **Resonance:** Types of resonance: Series & Parallel 6

Series resonance- resonant frequency, variation of impedance, admittance, current & voltage across L & C with respect to frequency, Effect of resistance on frequency response, Selectivity, B.W. & Quality factor.

Parallel resonance – Anti resonant frequency, variation of impedance & admittance with frequency, Selectivity & B.W.

Unit V **Transient Response:** Network Solution using Laplace transforms, Initial Conditions of elements. Steady state & transient response (Voltage & Current) DC response of RL circuit, DC response of RC circuit, DC response of RLC circuit, Sinusoidal response of RL, RC & RLC circuit 6

Course Outcome (CO) : Upon successful completion of this course, the student will be able to

1. Determine voltage, current, power and impedance at various nodes and loops using simplification techniques
2. Understand and analyze the basic A.C., D.C. circuits using network theorems
3. Characterize, model and analyze the network in terms of network functions and parameters
4. Demonstrate knowledge of resonance in series and parallel circuits
5. Explain characteristics of capacitor, inductor and compute initial conditions for current and voltage in 1st order (RC, RL) and 2nd order (RLC) circuits

Text Books

1. A. Sudhakar , Shyammohan S.Palli, “Circuit & Network – Analysis & Synthesis”, IIIrd Edition – Tata McGraw Hill Publication
2. A.Chakrabarti, “Circuit Theory (Analysis & Synthesis)”, IIIrd Edition Dhanpat Rai & co.
3. Soni Gupta, “Electrical Circuit Analysis”, Dhanpat Rai & Co.

Reference Books

1. Allan Robbins, Wilhelm C. Miller, “Circuit Analysis Theory and Practice”, Cenage Learning.
2. J. David Irwin, R. Mark Nelms, “Basic Engineering Circuit Analysis”, Wiley Publication
3. William H Hayt, Jack E Kimmerly and Steven M.Durbin, “Engineering Circuit Analysis”, TMH
4. M.E.Van Valkenburg, “Network Analysis”, IIIrd Edition, Pearson Education/PHI

Useful Links

1. http://www.nptel.ac.in/courses/108102042
2. http://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/

Mapping of CO and PO

	PO												PSO	
	a	B	C	d	E	F	g	h	i	j	K	l	M	N
CO1	√	√	√	√								√	√	√
CO2	√	√	√	√								√	√	√
CO3	√	√	√	√							√	√	√	√
CO4	√	√	√	√						√		√		√
CO5	√	√	√	√	√					√		√		√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	2	12
Understand	3	3	2	12
Apply	3	3	2	12
Analyse	3	3	2	12
Evaluate	3	3	2	12
Create				12
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech.
EX403:Analog Communication

Teaching Scheme		Examination Scheme	
Lectures	4 Hrs/week	**CT1**	15
Tutorials	--	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : This course aims to

1. Implement & analyse the basic analog communication techniques/ circuits with the help of theoretical and practical problem solving.
2. Make strong foundation of time domain and frequency domain analysis of modulation techniques.
3. Estimate noise in communication systems
4. Analyse basics and circuits of pulse modulations

Course Contents		Hours
Unit I	**COMMUNICATION SYSTEM AND NOISE:** Communication system, need of modulation, types of analog modulation, noise-classification of noise, external noise and internal noise, noise due to several sources, noise due to several amplifier in cascade, noise in reactive circuit	6
Unit II	**AMPLITUDE MODULATION:** frequency spectrum, time and frequency domains, Review of Fourier analysis, Amplitude Modulation (AM), DSB-SC, SSB, VSB and ISB transmissions, mathematical Analysis, modulation index, frequency spectrum, power requirement of these systems, frequency division multiplexing	8
Unit III	**ANGLE MODULATION:** Frequency Modulation (FM), mathematical Analysis, modulation index, frequency spectrum, power requirement of FM, narrowband & wideband FM, pre-emphasis and de-emphasis techniques, phase modulation, power contents of the carrier & the sidebands in angle modulation, generation of FM signals, comparison between AM & FM.	8
Unit IV	**RADIO RECEIVERS:** Basic receiver (TRF), Super heterodyne receiver, performance parameters for receiver such as sensitivity, selectivity, fidelity, image frequency rejection etc., AM detectors, FM discriminators, AGC technique, double-spotting effect	6
Unit V	**NOISE ANALYSIS:** SNR for AM & FM for low noise condition, noise figure, calculation of noise figure, noise figure from measurement, noise temperature, noise reduction characteristics of angle modulation	6

Unit VI **PULSE MODULATION AND MULTIPLEXING** 8

Sampling theorem, Types of sampling-ideal, natural, flat top sampling, quantization, concept, generation and detection - pulse amplitude modulation (PAM), pulse width modulation (PWM), pulse position modulation (PPM), pulse code modulation (PCM), companding, A-law and μ-law companding, delta modulation(DM), adaptive delta modulation(ADM), Linear predictive coding, multiplexing- frequency division multiplexing and time division multiplexing.

Course Outcome : Upon successful completion of this course, the student will be able to

1 Know the communication system and be able to analyse different types of noise
2 Analyse different analog modulation techniques
3 Know techniques of transmission and reception of analog signal
4 Know pulse modulation techniques.
5 Be able to analyse multiplexing techniques

Text Books

1 D. Kennedy, “Electronic Communication Systems”, 4th edition, Tata McGraw-Hill, 1999.
2 Taub, Schilling and G.Saha, “Principles of Communication Systems”, 3rd edition, McGrawHill, 1995.
3 B.P. Lathi, “Communication Systems”, BS publications.

Reference Books

1 A. Bruce Carlson, “Communication Systems”, 4th edition, McGraw-Hill, 2006.
2 S. Haykin, “Communication Systems”, 4th edition, John wiley & Sons, 2000.
3 Roddy and Coolen, “Electronic Communication”, 4th edition, Prentice Hall of India, 2003.

Useful Links

1. http://nptel.ac.in/courses/117102059/
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-450-principles-of-digital-communications-i-fall-2006/video-lectures/

Mapping of CO and PO

	PO												PSO	
	a	b	C	d	e	f	g	h	i	j	K	l	m	N
CO1	√	√				√				√	√			√
CO2	√	√	√	√				√			√	√		√
CO3	√	√			√	√	√		√	√				
CO4		√	√	√							√	√		
CO5		√		√								√		

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	2.5	15
Understand	5	5		15
Apply			2.5	10
Analyse			2.5	10
Evaluate	5	5	2.5	10
Create				
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech.
EX404 : Signals and Systems

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	3	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : This course aims to

1. Describe basic signals mathematically and understand how to perform mathematical operations on signals.
2. Understand systems classification, properties & apply skills to solve problems.
3. Know the Fourier series & Transforms for representation of periodic and periodic signals.
4. Analyse the systems in time & frequency domain by applying knowledge of Fourier & Z-Transforms.

Course Contents **Hours**

Unit I **Introduction :** 8

A) **An introduction to signals and systems:** Definitions of Signals and Systems, Signals and systems as seen in everyday life, and in various branches of engineering and science electrical, mechanical, hydraulic, thermal, biomedical signals and systems as examples. Extracting the common essence and requirements of signal and system analysis from these examples. (1 L)

B) **Signals and Classification of Signals:** Analogy between Signals and Vectors, Continuous time signals & discrete time, analog & digital. (1 L) Basic CT & DT signals: unit impulse, unit step, unit ramp, complex exponential & sinusoidal, sinc, rectangular, triangular and signum. (1 L) Operations on signals: Amplitude Scaling, Addition, Multiplication, Differentiation, Integration, (1 L) Time Scaling and Folding, Time Shifting, Precedence rule. (1 L) Classification of Signals: even & odd signals, periodic & non-periodic, deterministic & non-deterministic, energy & power. Operations on Signals (1 L).

C) **System and Classification of Systems:** System Representation, continuous time Systems & discrete Systems, system with and without memory (static and dynamic), causal and non-causal system, linear and non-linear system, Time invariant and time variant system, Stable and Unstable system, Invertible Systems, properties of systems. (2 L)

Unit II **LTI Systems and Convolution:** 6

Linear time-invariant systems: The representation of signals in term of impulses, discrete time LTI systems, continuous time-LTI systems, properties of CT- LTI and DT-LTI systems. (2 L)

Convolution: Convolution integral & its properties, convolution sum & its properties, Systems described by differential, difference equations, block diagram representation of LTI systems described by differential difference equations,

Singularity functions. (4 L)

Unit III **Fourier Series for Continuous Time & Discrete Time Signals:** 4

Continuous time Fourier series: Trigonometric and exponential Fourier series, Relation between trigonometric and exponential Fourier series. Discrete time Fourier Series, properties of Fourier series.

Unit IV **Fourier Transform:** 6

From Fourier series to Fourier Transform, Fourier Transform pair, Fourier Spectra, Convergence of FT.

Properties of Fourier transform: linearity, time shifting, frequency scaling, time scaling, time reversal, duality, differentiation in time domain and frequency domain, Integral in time domain, multiplication, and convolution and Parseval's relation.

Unit V **Laplace Transform:** 6

Definition and its properties, ROC and pole zero concept. Application of Laplace transforms to the LTI system analysis. Inversion using duality, numerical based on properties. Signal analysis using LT.

Unit VI **Z transform:** 6

Introduction of Z-transform, Relation between DTFT and Z-transform, ROC, properties of ROC, Unilateral Z-transform, properties of Z transform: linearity, time shifting, time reversal, time scaling, convolution, differentiation, multiplication, Parseval's theorem, initial value & final value theorem. Inverse Z-transform: long division method, PFE method, residue method. Transfer function (Poles & Zeros), stability and causality. Representation of system via difference equation and solutions.

Course Outcome (CO) : Upon successful completion of this course, the student will be able to

1. Define CT and DT signals mathematically & solve problems related to operations on signals.
2. Classify different systems & understand their properties.
3. Understand the concept of convolution and its applications.
4. Apply different tools like Fourier Series, Fourier Transform, Laplace Transform and Z-transform to analyse the systems in time and frequency domains.

Text Books

1. Hsu, "Signals & system" (Schaum's outlines), Tata McGraw Hill
2. Ramesh Babu, "Signals & system", SciTech Publication.
3. Simon Haykin, Barry Van Veen, "Signals & system", Wiley publication

Reference Books

1. Michael J. Roberts, "Fundamentals of signals & systems", Tata McGraw Hill.
2. Mandal and Asif, "Continuous and Discrete Time Signals and Systems", Cambridge University Press.
3. Dr. D. D. Shaha and Dr. A. C. Bhagali, "Signals and Systems", MPH.
4. B. P. Lathi, "Signals Systems and Communication", BS Publications.

Useful Links

1 http://nptel.ac.in/courses/117104074/
2 http://nptel.ac.in/downloads/117101055/
3 http://textofvideo.nptel.iitm.ac.in/video.php?courseId=117104074

Mapping of CO and PO

	PO												PSO	
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
CO1	√	√	√	√							√	√	√	√
CO2	√	√	√	√							√	√	√	√
CO3	√	√	√	√							√	√	√	√
CO4	√	√	√	√							√	√	√	√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	3	2	12
Understand		3	2	12
Apply	5	3	2	12
Analyze		3	1	12
Evaluate	5	3	3	12
Create			1	
Total	15	15	10	60

***Note for paper setter:** 30% theory and 70% numerical and Design from entire syllabus.

Government College of Engineering, Karad
Second Year B. Tech.
EX405: Electromagnetic Engineering

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	1 Hr/week	**CT2**	15
Total Credits	4	**TA**	10
		ESE	60
		Duration of ESE	2 Hrs 30 min

Course Objectives : This course aims to

1. Provide fundamentals of Static Fields.
2. Explain basics of the vector Differential, Integral operators to Electrostatic & magneto static.
3. Define and derive different laws in Electrostatic & Electromagnetic fields.
4. Explain Maxwell's equations and concepts of EM waves.
5. Study various parameters in transmission line.

Course Contents		**Hours**
Unit I	**Basics of electromagnetics**: Review of scalars and vectors, The coordinate system: rectangular, cylindrical and spherical. gradient, divergence and curl. dielectric: permittivity and permeability, differential elements of length, surface and volume.	7
Unit II	**Electrostatic**s : Introduction to Coulomb's law, electric field intensity, field of line charges, field of surface charges, flux density, Gauss's law, divergence theorem, electric potential and potential gradient.dipole and dipole moment, polarisation ,method of images, Boundary conditions for Electrostatic	7
Unit III	**Magnetostatics:** Current and current density, continuity equation, Biot-Savart law, Ampere's circuital law and applications, Stokes theorem, magnetic flux and flux density, vector magnetic potentials. boundary conditions for Magnetostatic	7
Unit IV	**Maxwell's equations** : steady field, time varying fields, Maxwell's equations in point form and integral form	4
Unit V	**Electromagnetic waves** : Electromagnetic wave equation, wave propagation in free space, in a perfect dielectric, and perfect conductor, wave polarization, skin effect, Poynting theorem, reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle. Wave propagation through guided media (Rectangular waveguide) and various modes of propagation.	9
Unit VI	**Transmission lines :** Introduction, concept of distributed elements, equations of voltage and current , standing waves and impedance transformation, lossless and low-loss transmission lines, smith chart and impedance matching using transmission lines	8

Note:

- Tutorials for the subject shall be engaged in minimum of four batches (batch size of 20 students Maximum) per division.

- Teachers Assessment shall consist of minimum 8 tutorials from entire syllabus.

Course Outcome (CO) : Upon successful completion of this course, the student will be able to

1 Comprehend the fundamentals of Electrostatic and Electromagnetic fields.
2 Demonstrate mathematical skills related with differential, integral and vector calculus
3 Apply Gauss' law, Ampere's Law, Biot-Savart law, Faraday's law and laws related with steady magnetic field while solving problems in Electrostatic and Electromagnetic fields.
4 Develop field equations from understanding of Maxwell's Equations.
5 Extend the knowledge of basic properties of transmission lines to analyse electromagnetic wave propagation in generic transmission line geometries.

Text Books

1 W.H Hayt. and J.A. Buck, "Engineering Electromagnetics", 7th edition, Tata McGraw Hill, 2006.
2 G. S. N. Raju, "Electromagnetic Field Theory and Transmission Lines", Pearson Education.
3 E.C. Jordan and K.C. Balamin, "Electromagnetic Waves and Radiating System", 2nd edition, Prentice Hall of India Private Limited, 1985.

Reference Books

1 Rao, Edward C. Jordan, "Elements of Engineering Electromagnetics", 6th edition, Pearson Education, 2006.
2 J. D. Krauss, "Electromagnetics", 3rd edition, Mc-Graw Hill, 1984.
3 S. Ramo and R.Whinnery, "Fields and Waves in Communication Electronics", 3rd edition, John Wiley and Sons, 2009.
4 K. E.Lonngren and S. V. Savov, "Fundamental of Electromagnetic with MATLAB", 1st Prentice Hall of India, 2008.

Mapping of CO and PO

	PO												PSO	
	a	b	c	d	e	f	g	h	i	j	K	l	m	n
CO1	√	√	√							√	√	√		
CO2	√	√	√	√				√		√		√		√
CO3	√	√		√						√	√	√		
CO4	√	√		√	√	√					√	√		
CO5	√				√		√		√			√		√

Assessment Pattern

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	5	10
Understand	4	4		10
Apply	4	4		15
Analyze	4	4	5	15
Evaluate				10
Create				
Total	15	15	10	60

Government College of Engineering, Karad
Second Year B. Tech
EX406: Analog Integrated Circuits Lab

Laboratory Scheme		Examination Scheme	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	50

Course Objectives : This course aims to

1. Understand the characteristics of IC and Op-Amp and identify the internal structure.
2. Understand measurement of frequency response for various amplifiers.
3. Understand and verify results (levels of V & I) with hardware implementation.
4. Analyse and identify linear and nonlinear applications of Op-Amp.

Course Contents

Experiment 1	Design and frequency response of two stage RC coupled amplifier
Experiment 2	Design and frequency response of voltage series feedback amplifier.
Experiment 3	Measurement Op-Amp Parameters. 1) Input Bias current 2) Input Offset current 3) Input Offset voltage 4) CMRR.
Experiment 4	Design of Inverting and Non inverting amplifier using Op-Amp.
Experiment 5	Design, build and test Integrator and Differentiator.
Experiment 6	Design, build and test precision rectifier.
Experiment 7	Design, build and test comparator and Schmitt trigger.
Experiment 8	Design and implementation of Square wave and Triangular wave generator using Op-Amp.
Experiment 9	Design of Active filters (LPF & HPF) using Op-Amp.
Experiment 10	Design and implementation Wien bridge oscillator using Op-Amp.
Experiment 11	Design and simulate monostable and astable multivibrator using multisim.
Experiment 12	Design and simulate clipper and clamper using multisim.
Note:	Any 10 practical's to be conducted from the above list.

List of Submission

1. Total number of Experiments:10
2. Total number of sheet: NA
3. Project/Dissertation Report: NA
4. Seminar report: NA
5. Field Visit Report: NA

Additional Information

Course Outcome(CO) : Upon successful completion of this course, the student will be able to

1. Handle various electronic devices, instruments and circuits as well as Bread board and routing on breadboard.
2. Design and test BJT amplifiers on breadboard and measurement of their parameters.
3. Build and implement various applications of op-amp and draw output voltage waveforms.
4. Simulate linear & non-linear circuits on software.

Mapping of CO and PO

	PO												PSO	
	a	b	c	d	E	f	g	h	i	j	K	l	m	n
CO1			√							√	√	√		
CO2	√		√							√	√			√
CO3	√		√	√	√					√	√			√
CO4	√		√	√	√						√	√	√	√

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	TA	ESE
Assembling	√	√	√	√	√	√	√	√	√	√			√	√
Testing	√	√	√	√	√	√	√	√	√	√			√	√
Observing	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Analyzing	√	√					√	√	√		√	√	√	√
Interpreting		√							√		√	√	√	√
Designing	√	√	√	√	√	√	√	√	√	√			√	√
Creating									√	√			√	√
Deducing conclusions	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Total	10	10	10	10	10	10	10	10	10	10	10	10	25	50

Government College of Engineering, Karad
Second Year B. Tech.
EX407 : HDL LAB

Teaching Scheme		**Examination Scheme**	
Tutorial	1 Hr/week	**CA**	25
Practical	2 Hrs/week	**ESE**	50
Total Credits	2		

Course Objectives : This course aims to

1. Explain students the fundamental concepts of Hardware Description Language and design flow of digital system design.
2. Make students able to design combinational and sequential logic circuits using Data flow and Behavioural modelling styles.
3. Provide students an understanding of structural description for designing of digital circuits.
4. Explain students the concepts of Packages, Functions and Procedures and its usage for designing digital systems.

Course Contents		**Hours**
Unit I	**Introduction to HDL**: **Need of HDL**, A brief history of VHDL, design flow, EDA tools, structure of VHDL module, operators, data types, attributes, types of descriptions, simulation and synthesis.	3
Unit II	**Data Flow and behavioural descriptions:** Highlights of data flow descriptions, structure of data flow descriptions, highlights of behavioural descriptions, structure of behavioural descriptions, combinational logic design and sequential logic design (including FSM) using data flow and behavioural modelling styles.	4
Unit III	**Structural Descriptions** : Highlights of structural descriptions, organization of structural descriptions, Binding, Generate, Generic and parameter statements, design of combinational and sequential logic circuits using structural modelling style.	3
Unit IV	**Packages, Functions and Procedures:** Highlights of Packages, functions and Procedures, Function versus Procedures, additional examples on system design.	2

Lab Course Contents

Experiment 1	1) To design and simulate all the logic gates in VHDL and its implementation on CPLD/ FPGA kit. 2) To design and simulate Binary to Gray and Gray To Binary Code Converter in VHDL and its implementation on CPLD/ FPGA kit.
Experiment 2	1) To design half adder and full adder using Dataflow and behavioural modelling and its implementation on CPLD/FPGA kit. 2) To design half Subtractor and full Subtractor using Dataflow and behavioural modelling and its implementation on CPLD/FPGA kit.
Experiment 3	1) To design and simulate 2X1 MUX, 4X1 MUX, 8X1 MUX using Dataflow and behavioural modelling.

	2) To design and simulate 1X2 DEMUX, 1X4 DEMUX, 1X8 DEMUX using Dataflow and behavioural modelling
Experiment 4	1) To design and simulate 4X2 encoder, 8X3 encoder in VHDL using dataflow and behavioural modelling. 2) To design and simulate 2X4 decoder and 3X8 decoder in VHDL using dataflow and behavioural modelling.
Experiment 5	To design and simulate VHDL code for half adder and full adder using structural description and its implementation on CPLD/ FPGA kit.
Experiment 6	To design and simulate VHDL code for 4X1 MUX, 1X4 DEMUX, 4X2 encoder and 2X4 decoder with the help of structural description.
Experiment 7	To design and simulate all the type of flip-flops using sequential constructs.
Experiment 8	1) To design and simulate VHDL code for eight bit shift register. 2) To design and simulate VHDL code for eight bit Johnsons counter.
Experiment 9	To design and simulate VHDL code for sequence detector and its implementation on CPLD/ FPGA kit.
Experiment 10	To design and simulate VHDL code for a full adder using two half adders with the use of PROCEDURE.

List of Submission

1. Total number of Experiments:10
2. Total number of sheets: NA
3. Project/Dissertation Report: NA
4. Seminar report: NA
5. Field Visit Report: NA

Course Outcome (CO) : Upon successful completion of this course, the student will be able to

1. Implement and demonstrate the design flow of digital circuit design using VHDL.
2. Design combinational circuits like adder, subtractor, multiplexer, Encoder, Decoder, comparator etc. using various description techniques in VHDL.
3. Design the sequential logic circuits like flip-flops, registers, counters, sequence detectors etc. using various description techniques in VHDL.
4. Design digital systems using VHDL elements like Packages, Functions, Procedures.

Text Books

1. Nazeih M. Botros, “HDL Programming” (VHDL and Verilog), John Weily India Pvt. Ltd. 2008.
2. Stephen Brown and Zvonko Vranesic, “Fundamentals of Digital Logic with VHDL design”, Tata–Mcgraw Hill.
3. Velnoi A. Pedroni, “Circuit Design with VHDL”, MIT Press, Cambridge, Massachusetts

Reference Books

1. Douglas L. Perry, “VHDL Programming by Examples”, fourth Edition, Tata McGraw-Hill.
2. Charles S. Roth, “Principals of Digital System Design using VHDL”, Cengage Learning, Jr. PWS publications.
3. Jayram Bhaskar, “A VHDL Primer”, AWL publication.
4. Enoch O. Hwang, “Digital logic and microprocessor design”, Nelson Engineering; Har/Cdr edition.

Useful Links

1. www.xilinx.com
2. Xilinx synthesis tool details- xst.pdf
3. www.cs.lasierra.edu/~ehwang

Mapping of CO and PO

	PO												PSO	
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
CO1	√	√	√	√	√				√		√	√	√	√
CO2	√	√	√	√	√				√		√	√	√	√
CO3	√	√	√	√	√				√		√	√	√	√
CO4	√	√	√	√	√				√		√	√	√	√

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	TA	ESE
Assembling												
Testing	√	√	√	√	√	√	√	√	√	√	√	√
Observing	√	√	√	√	√	√	√	√	√	√	√	√
Analysing	√	√	√	√	√	√	√	√	√	√	√	√
Interpreting	√	√	√	√	√	√	√	√	√	√	√	√
Designing	√	√	√	√	√	√	√	√	√	√	√	√
Creating												
Deducing conclusions	√	√	√	√	√	√	√	√	√	√	√	√
Total	10	10	10	10	10	10	10	10	10	10	25	50

Government College of Engineering, Karad
Second Year B. Tech
EX408: Analog Communication Lab

Laboratory Scheme		Examination Scheme	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	50

Course Objectives : This course aims to

1. Familiarize several modulation & demodulation techniques in communication
2. Implement communication systems of given specification
3. Enhance mathematical skill as well problem solving power

Course Contents

Experiment 1	Practical implementation of Amplitude modulation and demodulation.
Experiment 2	Calculation of modulation index by graphical method of DSBFC signal & measurement of power of AM wave for different modulating signal.
Experiment 3	SSB modulation using any method (filter method, Phase shift method) and its detection.
Experiment 4	Envelope detector- Practical diode detector.
Experiment 5	Performance and analysis of AM system using trapezoidal method
Experiment 6	Performance and analysis of frequency modulator system and also find the modulation index.
Experiment 7	Experiment on Sampling and reconstruction and also observe aliasing effect by varying sampling frequency.
Experiment 8	Practical implementation of PAM system
Experiment 9	Practical implementation of PPM system
Experiment 10	Practical implementation of PWM system
Experiment 11	Practical implementation of PAM-TDM systems.
Experiment 12	Experiment on Pre-emphasis and De-emphasis.
Experiment 13	Visit to AIR (Compulsory)

NOTE : At least 10 experiments are compulsory out of which minimum 2 should be performed on simulation software

List of Submission

1. Total number of Experiments: 10
2. Total number of sheets: NA
3. Project Report of Industrial visits: NA

Additional Information

Course Outcome(CO) : Upon successful completion of this course, the student will be able to

1 Design to modulating & demodulating circuits
2 Perform sampling of signals
3 Analyse various pulse modulation techniques

Mapping of CO and PO

	PO												PSO	
	a	b	c	d	e	f	g	h	i	j	K	l	m	n
CO1	√	√		√	√			√				√		√
CO2		√	√			√		√	√	√	√	√		
CO3	√			√	√		√		√	√				√

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Exp 12	TA	ESE
Assembling							√	√	√	√			√	√
Testing		√		√	√						√		√	√
Observing	√		√			√	√	√	√	√		√	√	√
Analysing		√		√		√	√						√	√
Interpreting	√	√	√		√		√					√	√	√
Designing													√	√
Creating						√		√	√	√	√		√	√
Deducing conclusions	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Total	10	10	10	10	10	10	10	10	10	10	10	10	25	50

Government College of Engineering, Karad
Second Year B. Tech
EX409 : Signals and Systems Lab

Laboratory Scheme		**Examination Scheme**	
Practical	2 Hrs/week	**CA**	25
Total Credits	1	**ESE**	--

Course Objectives : This course aims to

1. Implement different concepts and methods of handling signals and systems in MATLAB environment.
2. Understand the different MATLAB functions and tools.
3. Effective MATLAB programming using different functions and commands

Course Contents

Experiment 1	Introduction to MATLAB with matrix manipulation techniques.
Experiment 2	Introduction to Graph Plotting: To plot graphs of signals like Basic Signals (both in CT and DT), Addition, Subtraction and Multiplication of given CT and DT signals in MATLAB environment.
Experiment 3	Program for signal operations on Trigonometric Signals: Time Shifting, Time Scaling, Amplitude Shifting, Combined Operations.
Experiment 4	Program using branching and looping statements.
Experiment 5	Program for Classification of Signals and Systems.
Experiment 6	Program for DT Convolution (without and with use of in-built MATLAB function).
Experiment 7	Program for handling complex data.
Experiment 8	Program for obtaining Forward and Inverse Transforms of a given DT Signal. (Forward and Inverse Fourier Transform, Laplace Transform and Z-transform)
Experiment 9	Program using user defined function using MATLAB.
Experiment 10	Program for creating & Displaying GUI using MATLAB.

List of Submission

1. Total number of Experiments: 10
2. Total number of sheets: NA
3. Project/Dissertation Report: NA
4. Seminar report: NA
5. Field Visit Report: NA

Additional Information

Course Outcome : Upon successful completion of this course, the student will be able to

1. Implement, test and develop various signal/system handling algorithms in MATLAB.
2. Analyse and simulate the various signals and systems in MATLAB.
3. Use the different commands, functions required for programming in MATLAB
4. Calculate and perform various operations using MATLAB.

Mapping of CO and PO

	PO												PSO	
	a	b	c	d	e	f	g	h	i	j	k	l	m	N
CO1	√	√	√	√	√				√		√	√	√	√
CO2	√	√	√	√	√				√		√	√	√	√
CO3	√	√	√	√	√				√		√	√	√	√
CO4	√	√	√	√	√				√		√	√	√	√

Assessment Pattern

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	TA	ESE
Assembling												NA
Testing												
Observing	√	√	√	√	√	√	√	√	√	√	√	
Analysing	√	√	√	√	√	√	√	√	√	√	√	
Interpreting	√	√	√	√	√	√	√	√	√	√	√	
Designing	√	√	√	√	√	√	√	√	√	√	√	
Creating												
Deducing conclusions	√	√	√	√	√	√	√	√	√	√	√	
Total	10	10	10	10	10	10	10	10	10	10	25	