CENTRAL UNIVERSITY OF KARNATAKA
KALABURAGI

SCHOOL OF ENGINEERING

COURSE STRUCTURE AND SYLLABUS

3rd and 4th Semester

B.Tech. -2020 Batch

ELECTRONICS & COMMUNICATION ENGINEERING

Learning Outcomes-based Curriculum Framework

(Effective from the academic year 2021 –22)

Department of Electronics & Communication Engineering
School of Engineering
Central University of Karnataka
Kalaburagi-585367

SCHOOL OF ENGINEERING

COURSE STRUCTURE - SECOND YEAR B. TECH

ELECTRONICS & COMMUNICATION ENGINEERING

(Effective from the academic year 2021-22)

III SEMESTER												
Course code	**Course Type**	**Course Title**	**Teaching Hrs./Week**				**Examination**				**Credits**
			Theory/ Lecture	**Tutorial**	**Practical/ Drawing**	**Total**	**Duration in Hrs.**	**IA Marks**	**End Sem Marks**	**Total Marks**	
			L	**T**	**P**						
UECTCC3001	CC	Analog Electronics and Instrumentation	3	1	-	4	2.5	30	45	75	3
UECTCC3002	CC	Digital Electronics	3	1	-	4	2.5	30	45	75	3
UECTCC3003	CC	Network Analysis	3	1	-	4	2.5	30	45	75	3
UECTCC3004	CC	Computing Applications with Python	3	1	-	4	2.5	30	45	75	3
UECPCC3005	CC	Analog Electronics Lab	-	-	3	3	3	20	30	50	2
UECPCC3006	CC	Digital Electronics Lab	-	-	3	3	3	20	30	50	2
UECTGE3091	GE	NPTEL online course (Introduction to Abstract & Linear Algebra)	3	-	-	3	3	20	30	50	2
UECPCC3007	CC	Signal Processing Lab	-	1	2	3	3	20	30	50	2
		Total	**15**	**5**	**8**	**28**	**22**	**200**	**300**	**500**	**20**

Note: 1. CC-Core Course, DS-Discipline specific Elective, AE-Ability Enhancement course and GE-Generic Elective courses

2. Environmental Science is a mandatory non-graded course. This course shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

SCHOOL OF ENGINEERING

COURSE STRUCTURE - SECOND YEAR B. TECH

ELECTRONICS & COMMUNICATION ENGINEERING

(Effective from the academic year 2021-22)

IV SEMESTER											
Course code	**Course Type**	**Course Title**	**Teaching Hrs./Week**				**Examination**				**Credits**
			Theory/ Lecture	**Tutorial**	**Practical/ Drawing**	**Total**	**Duration in Hrs.**	**IA Marks**	**End Sem Marks**	**Total Marks**	
			L	**T**	**P**						
UECTCC4001	CC	Microprocessor and Microcontroller	3	1	-	4	2.5	30	45	75	3
UECTCC4002	CC	Analog Communication Engineering	3	1	-	4	2.5	30	45	75	3
UECTCC4003	CC	Electromagnetic Theory	3	1	-	4	2.5	30	45	75	3
UECTCC4004	CC	Control systems	3	1	-	4	2.5	30	45	75	3
UECPCC4005	CC	Microprocessor and Microcontroller Lab	-	-	3	3	3	20	30	50	2
UECPCC4006	CC	Analog Communication Engineering Lab	-	-	3	3	3	20	30	50	2
UECTGE4092	GE	NPTEL online course (Renewable Energy Engg)	3	-	-	3	3	20	30	50	2
UECPCC4007	CC	Operating System Lab	-	1	2	3	3	20	30	50	2
		Total	**15**	**5**	**8**	**28**	**22**	**200**	**300**	**500**	**20**

Note: 1. CC-Core Course, DS-Discipline specific Elective, AE-Ability Enhancement course and GE-Generic Elective courses

2. Environmental Science is a mandatory non-graded course. This course shall not be considered for vertical progression, but completion of the courses shall be mandatory for the award of degree.

COURSE CONTENTS

SEMESTER-III

ANALOG ELECTRONICS & INSTRUMENTATION

Semester	**:**	**III**	**Internal Assessment**	**:**	**30**
Course Code	**:**	**UECTCC3001**	**End Sem. Exam**	**:**	**45**
Teaching Hours/Week (L:T:P)	**:**	**3:1:0**	**Exam Duration (Hours)**	**:**	**2.5**
Credits: 03					

PREREQUSITES

Exposure to Basic Electronics, PN junction diodes, NPN/PNP BJTs.

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Analyse the response of BJTs for AC signals.
CO2. Understand the JFETs and apply the knowledge in designing amplifiers.
CO3. Understand the MOSFETs and apply the knowledge in designing amplifiers.
CO4. Apply the basics of positive feedback and design of sinusoidal oscillators.
CO5. Understand basic of instrumentation and transducers.

UNIT-I

BJT AC Analysis: The re transistor model, Common emitter fixed bias, Voltage divider bias, Emitter follower configuration. Darlington connection-DC bias; The Hybrid equivalent model, Approximate Hybrid Equivalent Circuit- Fixed bias, Voltage divider, Emitter follower configuration; Complete Hybrid equivalent model, Hybrid π . **RBT Levels: L1, L2, L3.**

UNIT-II

Field Effect Transistor: Construction and Characteristics of JFETs, Transfer Characteristics, Depletion type MOSFET, Enhancement type MOSFET. FET Amplifiers: JFET small signal model, Fixed bias configuration, Self-bias configuration, Voltage divider configuration, Common Gate configuration. Source-Follower Configuration, Cascade configuration. **RBT Levels: L1, L2, L3, L4.**

UNIT-III

Feedback & Oscillators: Feedback concepts, Feedback connection types, Practical feedback circuits, Oscillator operation, FET Phase shift oscillator, Wein bridge oscillator, Tuned Oscillator circuit, Crystal oscillator, UJT construction, UJT Oscillator. **RBT Levels: L1, L2, L3, L4.**

UNIT-IV

Introduction to Instrumentation: Measurement & Error: Definitions, Accuracy, Precision, Resolution and Significant Figures, Types of Errors, Measurement error combinations. Basics of Transducers: Resistive Transducers, Thermistors, LVDT, Photo-Electric Transducers. **RBT Levels: L1, L2.**

TEXT BOOKS

1. Robert L. Boylestad and Louis Nashelsky, *Electronics Devices and Circuit Theory*,Pearson, 10th Edition, 2012.

REFERENCE BOOKS

1. J. Millman and A. Grabel, *Microelectronics*, McGraw Hill Education, 1988.
2. A. S. Sedra and K. C. Smith, *Microelectronic Circuits*, New York, Oxford University Press, 1998.
3. Alan S Morris *Measurement and Instrumentation Principles*, Butterworth-Heinemann, 2001.

ONLINE RESOURCES

1. https://nptel.ac.in/courses/108/105/108105158/
2. https://nptel.ac.in/courses/108/102/108102095/

COURSE ASSESSMENT

A. **Continuous Assessment** (Weightage **30 Marks**)

- Two continuous assessments will be conducted with each one of 10 marks weightage
- **Remaining 10 marks** will be given for Assignments (Four Assignments will be given with one each from respective units).

B. **End Sem Examination** (Weightage **45 Marks**)

- One full question carries 11/12 Marks. Full question may be divided further into sub questions.
- There will be two full questions from each unit and a total of EIGHT FULL QUESTIONS.
- Student has to answer FOUR FULL QUESTIONS one from each unit i.e., Answering one full question from each unit is mandatory.

DIGITAL ELECTRONICS

Semester	**:**	**III**	**Internal Assessment**	**:**	**30**
Course Code	**:**	**UECTCC3002**	**End Sem. Exam**	**:**	**45**
Teaching Hours/Week (L:T:P)	**:**	**3:1:0**	**Exam Duration (Hours)**	**:**	**2.5**
Credits: 03					

PREREQUSITES

Basic exposure to electronic circuits, number systems, semiconductor and circuit theory.

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Understand various number systems and their conversion techniques.

CO2. Analyse the logics gates and design of digital ICs using these basic gates.

CO3. Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.

CO4. Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.

CO5. Apply the fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with different changing circumstances.

UNIT-I

Fundamentals of Digital Systems and Logic Families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic. **RBT Levels: L1, L2, L3.**

UNIT-II

Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization. **RBT Levels: L1, L2, L3, L4.**

UNIT-III

Sequential Circuits & Systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and Dtypes flipflops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter ICs, asynchronous sequential counters, applications of counters. channels. **RBT Levels: L1, L2, L3, L4.**

UNIT-IV

A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs algorithm. **RBT Levels: L1, L2, L3, L4.**

TEXT BOOKS

1. R. P. Jain, Modern Digital Electronics, Mc-Graw Hill Education, 2009.
2. M. M. Mano, *Digital Logic and Comupter Design*, Pearson Education India, 2016.

REFERENCE BOOKS

1. Anand Kumar, Fundamentals of Digital Circuits, Pearson Education India, 2016.
2. Digital Fundamentals, Williom Floyd, 11th Edition, Pearson Education India, 2015.

ONLINE RESOURCES

1. https://nptel.ac.in/courses/117/106/117106086/
2. https://nptel.ac.in/courses/108/105/108105113/

COURSE ASSESSMENT

A. Continuous Assessment (Weightage **30 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage
- **Remaining 10 marks** will be given for Assignments (Four Assignments will be given with one each from respective units).

B. **End Sem Examination** (Weightage **45 Marks**)

- One full question carries 11/12 Marks. Full question may be divided further into sub questions.
- There will be two full questions from each unit and a total of EIGHT FULL QUESTIONS.
- Student has to answer FOUR FULL QUESTIONS one from each unit i.e., Answering one full question from each unit is mandatory.

NETWORK ANALYSIS

Semester	**:**	**III**	**Internal Assessment**	**:**	**30**
Course Code	**:**	**UECTCC3003**	**End Sem. Exam**	**:**	**45**
Teaching Hours/Week (L:T:P)	**:**	**3:1:0**	**Exam Duration (Hours)**	**:**	**2.5**
Credits: 03					

PREREQUSITES

Exposure to Basic Electrical Engineering.

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Understand the concept of super node and super mesh.

CO2. Apply the basic electrical concept for analysis of cources.

CO3. Analyze and simplifying network parameters using network theorems.

CO4. Analysis of transient behavior of networks.

CO5. Calculate two port network parameters and their conversion.

UNIT-I

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, Concepts of super node and super mesh. **RBT Levels: L1, L2, L3, L4.**

UNIT-II

Network Theorems: Superposition, Reciprocity, Millman's theorems, Thevinin's and Norton's theorems, Maximum Power transfer theorem and Millers Theorem. **RBT Levels: L1, L2, L3, L4.**

UNIT-III

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. Laplace Transformation & Applications: Solution of networks, step, ramp and impulse responses, waveform Synthesis. **RBT Levels: L1, L2, L3, L4.**

UNIT-IV

Two Port Network Parameters: Definition of z, y, h and transmission parameters, modeling with these parameters, relationship between parameters sets. **RBT Levels: L1, L2.**

TEXT BOOKS

1. William Hayt, J. E. Kemmerly, J. D. Philips and S. M. Durbin, *Engineering Circuit Analysis*, Mc-Graw Hill 9th Edition, 2020.

2. Roy Choudhury, *Networks and Systems*, 2nd Edition, New Age International Publications, 2006.

REFERENCE BOOKS

1. M. E. Van Valkenberg, *Network Analysis*, Prentice Hall of India, 3rd Edition, 2000.

ONLINE RESOURCES

1. https://nptel.ac.in/courses/108/105/108105159/

COURSE ASSESSMENT

A. **Continuous Assessment** (Weightage **30 Marks**)

- Two continuous assessments will be conducted with each one of 10 marks weightage
- **Remaining 10 marks** will be given for Assignments (Four Assignments will be given with one each from respective units).

B. **End Sem Examination** (Weightage **45 Marks**)

- One full question carries 11/12 Marks. Full question may be divided further into sub questions.
- There will be two full questions from each unit and a total of EIGHT FULL QUESTIONS.
- Student has to answer FOUR FULL QUESTIONS one from each unit i.e., Answering one full question from each unit is mandatory.

COMPUTING APPLICATIONS WITH PYTHON

Semester :	**III**	**Internal Assessment** :	**30**
Course Code :	**UECTCC3004**	**End Sem. Exam** :	**45**
Teaching Hours/Week (L:T:P) :	**3:1:0**	**Exam Duration (Hourse)** :	**2.5**
Credits: 03			

PREREQUSITES

Exposure to programming languages and Basics “C” language.

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Describe the core syntax and semantics of Python programming language.
CO2. Discover the need for working with the strings and functions.
CO3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
CO4. Understand the usage of packages and Dictionaries.
CO5. Apply advanced level knowledge, techniques and skills in the field of computing.
CO6. Design and develop independent GUI systems.

UNIT-I

Introduction to Python: History of Python, Need of Python Programming and Applications.
Python Basics: Variables, Assignment, Keywords, Strings and Booleans.
RBT Levels: L1, L2.

UNIT-II

Operators and Expressions: Arithmetic, Relational, Assignment, Logical and Bitwise Operators, Membership and Identity Operators. Expressions and order of evaluations.
Control Flow: - if, if-elif-else, for, while, break, continue, pass
Data Structures: Lists, Tuples, Sets and Dictionaries: Operations
RBT Levels: L1, L2, L3, L4.

UNIT-III

Functions: - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Scope of the Variables in a Function - Global and Local Variables.;
Modules: Creating modules, import module and name spacing,
RBT Levels: L1, L2, L3, L4.

UNIT-IV

Python packages: Various packages, Introduction to PIP, Installing Packages via PIP,
GUI Programming: Introduction to Tkinter and Python Programming. Simple GUI building.
Applications to IoT and case study
RBT Levels: L1, L2, L3, L4.

TEXT BOOKS

1. Charles R. Severance, “Python for Everybody: Exploring Data Using Python 3”, 1st Edition, CreateSpace Independent Publishing Platform, 2016.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist”, 2nd Edition, Green Tea Press, 2015.

REFERENCE BOOKS

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt. Ltd. ISBN-13: 978-8126556014
2. Mark Lutz, “Programming Python”, 4th Edition, O’Reilly Media, 2011. ISBN-13: 978-9350232873
3. Reema Thareja, “Python Programming using problem solving approach”, Oxford university press, 2017

ONLINE RESOURCES

1. https://nptel.ac.in/courses/106/106/106106182/
2. https://onlinecourses.nptel.ac.in/noc21_cs21/preview
3. http://interactivepython.org/courselib/static/pythonds
4. http://www.ibiblio.org/g2swap/byteofpython/read/
5. http://www.diveintopython3.net/
6. http://greenteapress.com/wp/think-python-2e/

COURSE ASSESSMENT

A. Continuous Assessment (Weightage **30 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage
- **Remaining 10 marks** will be given for Assignments (Four Assignments will be given with one each from respective units).

B. **End Sem Examination** (Weightage **45 Marks**)

- One full question carries 11/12 Marks. Full question may be divided further into sub questions.
- There will be two full questions from each unit and a total of EIGHT FULL QUESTIONS.
- Student has to answer FOUR FULL QUESTIONS one from each unit i.e., Answering one full question from each unit is mandatory.

ANALOG ELECTRONICS LAB

Semester :	**III**	**Internal Assessment :**	**20**
Course Code :	**UECPCC3005**	**End Sem. Exam :**	**30**
Teaching Hours/Week (L:T:P) :	**0:0:3**	**Exam Duration (Hours) :**	**3.0**
Credits: 02			

PREREQUSITES

Exposure to analog circuits

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Recognize and demonstrate functioning of semiconductor devices.

CO2. Evaluate the characteristics, switching, and power conversion by semiconductor devices.

CO3. Analyze the response and plot the characteristics of Transducers such as LDR, Photodiode etc.

CO4. Design analog circuits using OPAMPs for different applications.

CO5. Analyse analog circuits that uses ICs for different electronic applications.

LIST OF EXPERIMENTS

1. Conduct experiment to test diode clipping (Single / double ended) and clamping circuits (positive / negative). **RBT Level: L1 to L4**
2. Half-wave rectifier and Full-wave rectifier with and without filter and measure the ripple factor. **RBT Level: L1 to L4**
3. Design a Zener voltage regulator and determine line and load regulation. **RBT Level: L1 to L4**
4. Characteristics of LDR and Photo diode **RBT Level: L1 to L4**
5. Design Adder, Integrator, and Differentiator circuits using Op-Amp **RBT Level: L1 to L4**
6. Design a Schmitt trigger for the given UTP and LTP values and obtain the hysteresis **RBT Level: L1 to L4**
7. Design a 4-bit R – 2R OPAMP Digital to Analog converter using 4-bit binary input. **RBT Level: L1 to L4**
8. Design Monostable and Astable multivibrator using 555 Timer. **RBT Level: L1 to L4**

TEXT BOOKS

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

REFERENCE BOOKS

1. Adel S Sedra, Kenneth S Smith, - Microelectronics Circuits, Theory and Applications, 6th Edition, Oxford, 2015.

2. Ramakanth A Gaekwad, - OPAMPS and Linear integrated Circuits, 4th Edition, Pearson Education, 2000.

COURSE ASSESSMENT

A. Continuous Assessment (Weightage **20 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage

B. **End Sem Examination** (Weightage **30 Marks**)

- An experiment will be allotted and the same has to be designed and performed by the student. For designing (theory part) 15 marks will be given and remaining 15 will be given for performing the experiment and showing the output.

DIGITAL ELECTRONICS LAB

Semester :	**III**	**Internal Assessment** :	**20**
Course Code :	**UECPCC3006**	**End Sem. Exam** :	**30**
Teaching Hours/Week (L:T:P) :	**0:0:3**	**Exam Duration (Hours)** :	**3.0**
Credits: 02			

PREREQUSITES

Exposure to Digital electronics

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Design, Realize and verify DeMorgan's Theorem, SOP, POS forms

CO2. Demonstrate the truth table of various expressions and combinational circuits using logic gates.

CO3. Design various combinational circuits such as adders, subtractors, comparators, multiplexers and demultiplexers.

CO4. Construct Flip-Flops and Counters.

CO5. Construct Shift Registers

LIST OF EXPERIMENTS

1. Verify i) DeMorgan's Theorem for 2 variables ii) The sum-of-product and product-of-sum expressions using universal gates. **RBT Level: L1 to L4**
2. Design and implement i) Half-adder and Full-adder using a) Basic gates b) NAND Gates
   ii) Half-substractor and Full-substractor using a) Basic gates and NAND gates. **RBT Level: L1 to L4**
3. Design and implementation of i) 1 bit comparator ii) 5-bit magnitude comparator using IC 7485. Ii) BCD to excess conversion and vice-versa. **RBT Level: L1 to L4**
4. Design and implement i) 4-bit parallel adder/subtractor using IC 7483. **RBT Level: L1 to L4**
5. Realize i) Adder and subtractor using IC 74153 ii) 4 Variable function using IC 74151 (8:1MUX) RBT **Level: L1 to L4**
6. Realize i) Adder and Subtractor using IC 74139 ii) Binary to Gray code coversion and vice-versa using 74139. **RBT Level: L1 to L4**
7. Realize the following flip-flops using NAND gates: Master-Slave J K, D and T Flip-Flops **RBT Level: L1 to L4**
8. Realize the following shift registers using using IC 7474 / 7495: i) Ring ii) Johnson counter.
9. Realize i) Design Mod-N Syncronous Up counter and Down counter using 7476 JK Flip-Flop ii) Mod-N counter using IC 7490 / 7476. **RBT Level: L1 to L4**
10. Design Pseudo Random Sequence generator using 7495. **RBT Level: L1 to L4**

TEXT BOOKS

1. D. P Kothari and J.S. Dhillon, - Digital circuits and Design, Pearson, 2016

REFERENCE BOOKS

1. Morris Mono, -. Digital Design, Prentice Hall of India, 3rd Edition.

COURSE ASSESSMENT

A. Continuous Assessment (Weightage **20 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage

B. **End Sem Examination** (Weightage **30 Marks**)

- An experiment will be allotted and the same has to be designed and performed by the student. For designing (theory part) 15 marks will be given and remaining 15 will be given for performing the experiment and showing the output.

SIGNAL PROCESSING LAB

Semester :	**III**	**Internal Assessment** :	**20**
Course Code :	**UECPCC3007**	**End Sem. Exam** :	**30**
Teaching Hours/Week (L:T:P) :	**0:1:2**	**Exam Duration (Hours)** :	**03**
Credits: 02			

PREREQUSITES

Signals and Systems, Fourier Series, Fourier Transform and FFT. MATLAB and Python programming

COURSE OUTCOMES

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

CO1. Carryout basic signal processing operations with Matlab and Python
CO2. Carryout basic image processing operations with Matlab and Python
CO3. Work with audio processing and operations with Python
CO4. Analyse Time and Frequency parts of signals with Matlab and Python

Signal processing with Matlab: RBT Levels: L1, L2, L3, L4.

1. Analog and Digital signals
2. Sampling and Reconstruction / Frequency Sampling
3. Reading and Displaying image
4. Image histogram / Image de-noising

Signal processing with Python: RBT Levels: L1, L2, L3, L4.

1. Signal's plotting
2. Sampling and Reconstruction
3. Frequency Spectrum (DFT / FFT)

Audio processing: RBT Levels: L1, L2, L3, L4.

1. Audio processing with Python on Linux
2. Audio signal and Spectrum
3. Audio signal de noising (Filtering)
4. Audio analysis

TEXT BOOKS

1. Yang, Won Young, Signals and Systems with MATLAB, Springer-Verlag Berlin Heidelber,2009, DOI: 10.1007/978-3-540-92954-3

2. Luis F. Chaparro,and Aydin Akan, Signals and Systems Using MATLAB, 3rd Edition, Academic Press, 2019, ISBN: 978-0-12-814204-2

COURSE ASSESSMENT

A. Continuous Assessment (Weightage **20 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage

B. **End Sem Examination** (Weightage **30 Marks**)

- An experiment will be allotted and the same has to be designed and performed by the student. For designing (theory part) 15 marks will be given and remaining 15 will be given for performing the experiment and showing the output.

SEMESTER-IV

MICROPROCESSOR AND MICROCONTROLLER

Semester :	**IV**	**Internal Assessment** :	**30**
Course Code :	**UECTCC4001**	**End Sem. Exam** :	**45**
Teaching Hours/Week (L:T:P) :	**3:1:0**	**Exam Duration (Hourse)** :	**2.5**
Credits: 03			

PREREQUSITES

Digital electronics, Basic computer operations and number system

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Develop a clear understanding of microprocessor, machine and assembly language.
CO2. Describe the architecture and functional block of 8085/8085 microprocessors.
CO3. Describe the architecture details of 8051 and Atmega328 microcontroller.
CO4. Develop an application using 8051 for the given specification.
CO5. Develop an application using Atmega328 microcontroller for the given specification.

UNIT-I

Basic functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU

Introduction to Microprocessors: Definition, Need and evolution of microprocessors.

Core of programming: Concept of machine language and assembly language. Building our own machine and assembly language. **RBT Levels: L1, L2.**

UNIT-II

Microprocessors:

Intel 8085: Features of 8085, Architecture, Pin diagram, Memory, Addressing modes and instructions.

Intel 8086: Features of 8086, Architecture, Pin diagram, Memory and Programming.

RBT Levels: L1, L2, L3.

UNIT-III

Microcontrollers:

Intel 8051: Features of 8051, Architecture, Pin diagram, Ports, Internal Memory and Addressing modes. Interrupts, Timers and Counters of 8051. Instructions of Programming 8051.

RBT Levels: L1, L2, L3, L4.

UNIT-IV

Advanced Microcontrollers:

AVR Microcontrollers: Introduction to AVR, Architecture, Pin Configuration, Registers, Addressing modes, Ports and DDR register and control operations, Programming with AVR.

Application development using Microcontrollers: **RBT Levels: L1, L2 L3, L4.**

TEXT BOOKS

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 6th Edition, Penram International Publishing.
2. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition 2006.
3. Kenneth.J.Ayala. The 8051 microcontroller, 3rd edition, Cengage learning,2010
4. Advanced microprocessors and peripherals-A. K ray and K.M.Bhurchandani, TMH, 2nd edition 2006.

REFERENCE BOOKS

1. Muhammad Ali Mazidi , Janice Gillispie Mazidi and Rolin D McKinlay, The 8051 microcontroller and embedded systems using assembly and C, second edition Pearson education Asia
2. Mohamed Rafiquzzaman, Microprocessor and Microcomputer based system design, second edition, CRC press.
3. Danny Causey, Muhammad Ali Mazidi, and Rolin D. McKinlay, PIC Microcontroller and Embedded SystemsUsing Assembly and. C for PIC18. Pearson 2008.

ONLINE RESOURCES

1. https://nptel.ac.in/courses/108/105/108105102/
2. https://nptel.ac.in/courses/117/104/117104072/

COURSE ASSESSMENT

A. Continuous Assessment (Weightage **30 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage
- **Remaining 10 marks** will be given for Assignments (Four Assignments will be given with one each from respective units).

B. **End Sem Examination** (Weightage **45 Marks**)

- One full question carries 11/12 Marks. Full question may be divided further into sub questions.
- There will be two full questions from each unit and a total of EIGHT FULL QUESTIONS.
- Student has to answer FOUR FULL QUESTIONS one from each unit i.e., Answering one full question from each unit is mandatory.

ANALOG COMMUNICATION ENGINEERING

Semester :	**IV**	**Internal Assessment** :	**30**
Course Code :	**UECTCC4002**	**End Sem. Exam** :	**45**
Teaching Hours/Week (L:T:P) :	**3:1:0**	**Exam Duration (Hours)** :	**2.5**
Credits: 03			

PREREQUSITES

Basic exposure to analog electronic circuits and amplifiers.

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Understand the performance of analog modulation schemes in time and frequency domains.

CO2. Apply basics of AM to analyse AM-DSB, SSB, and VSB systems.

CO3. Determine the performance of systems for generation and detection of AM and FM signals.

CO4. Characterize various types of noises and analysis of random variables and processes.

CO5. Determine the performance of AM and FM system in the presence of noise.

UNIT-I

Amplitude Modulation: Introduction AM: Time-Domain description, Frequency – Domain description. Generation of AM wave: square law modulator, switching modulator. Detection of AM waves: square law detector, envelop detector. Double Side Band Suppressed Carrier Modulation (DSBSC): Time and Frequency Domain description, Generation of DSBSC waves: balanced modulator, ring modulator. Coherent detection of DSBSC modulated waves. Single Side-Band Modulation (SSB): Quadrature carrier multiplexing, Hilbert Transform and Properties, Single side-band modulation, Frequency and Time Domain description of SSB wave, Phase discrimination method for generating an SSB modulated wave. Demodulation of SSB waves, Radio broadcasting, AM radio. **RBT Levels: L1, L2, L3.**

UNIT-II

Angle Modulation: Basic definitions, FM, narrow band FM, wide band FM, transmission bandwidth of FM waves, generation of FM waves: indirect FM and direct FM. Demodulation of FM waves, Phase-locked loop, Nonlinear model of the phase – locked loop, Linear model of the phase – locked loop. **RBT Levels: L1, L2, L3.**

UNIT-III

Random Variables, Processes & Noise: Random variables: Several random variables. Statistical averages: Function of Random variables, moments, Mean, Correlation and Covariance function: Principles of autocorrelation function, cross – correlation functions. Noise: Introduction, shot noise, thermal noise, white noise, Noise equivalent bandwidth, Narrow bandwidth, Noise Figure, Equivalent noise temperature, cascade connection of two-port networks. **RBT Levels: L1, L2, L3.**

UNIT-IV

Noise in Analog Modulation: Introduction, Receiver model, Noise in DSBSC receivers, Noise in SSB receivers, Noise in AM receivers, Threshold effect. Noise in FM receivers, FM threshold effect, Pre-emphasis and De-emphasis in FM. **RBT Levels: L1, L2, L3.**

TEXT BOOKS

1. Simon Haykins & Moher, Communication Systems, 5th Edition, John Willey, India Pvt. Ltd, 2010.
2. Simon Haykins & Moher, *An Introduction to Analog and Digital Communication*, John Wiley India Pvt. Ltd., 2012.

REFERENCE BOOKS

1. H. Taub, D. Schilling and G. Saha, Principles of Communications, Mc-Graw Hill India, 2017.
2. B. P. Lathi, Modern digital and Analog Communication systems Oxford University Press., 4th Edition, 2010.

ONLINE RESOURCES

1. https://nptel.ac.in/courses/117/105/117105143/ (Pl. ref. videos from week 4).

COURSE ASSESSMENT

A. **Continuous Assessment (**Weightage **30 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage
- **Remaining 10 marks** will be given for Assignments (Four Assignments will be given with one each from respective units).

B. **End Sem Examination** (Weightage **45 Marks**)

- One full question carries 11/12 Marks. Full question may be divided further into sub questions.
- There will be two full questions from each unit and a total of EIGHT FULL QUESTIONS.
- Student has to answer FOUR FULL QUESTIONS one from each unit i.e., Answering one full question from each unit is mandatory.

ELECTROMAGNETIC THEORY

Semester	**:**	**IV**	**Internal Assessment**	**:**	**30**
Course Code	**:**	**UECTCC4003**	**End Sem. Exam**	**:**	**45**
Teaching Hours/Week (L:T:P)	**:**	**3:1:0**	**Exam Duration (Hours)**	**:**	**2.5**
Credits: 03					

PREREQUSITES

Exposure to Physics and Vector calculus.

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Evaluate problems on electrostatic force by applying conventional methods.

CO2. Apply Gauss's law to evaluate electric fields by different charge distributions.

CO3. Determine potential and energy with respect to point charge and capacitance using Laplaces equation and Apply Biot-Savart and Ampere's law for evaluating magnetic field.

CO4. Calculate magnetic force, potential energy and magnetization with respect to magnetic materials.

CO5. Apply Maxwell's equations for time-varying fields and evaluate power associated in EM waves.

UNIT-I

Coulomb's Law and Electric Field Intensity: Experimental Law of Coulomb, Electric Field Intensity, Field due to continuous volume charge distribution, Field of a line chsrge, Numerical Problems.

Flux Density, Gauss's Law and Divergence: Electric Flux density, Gauss's Law, Application to Gauss;s Law to point charge, line charge, surface charge and volume charge, point form of Gauss law and divergence. Maxwelle;s first equation, Vector operator del and divergence Theorem, Numerical problems. **RBT Levels: L1, L2, L3.**

UNIT-II

Energy, Potential and Conductors: Energy expended or work done in moving a point charge in an electric field. The line integral, definition of potential difference and potential, potential field of a point charge, potential gradient, numerical problems. Current and current density, continuity of current.

Poisson's and Laplace's Equations: Derivation of Poisson's and Laplace's Equations, Uniqueness theorem. **RBT Levels: L1, L2, L3.**

UNIT-III

Steady Magnetic Field: Biot-Savert Law, Ameere's Circuital Law, Curl, Stokes' theorem, magnetic flux and magnetic flux density, basic concepts of scalar and vector magnetic potentials, numerical problems,

Magnetic forces: Force on a moving charge, Differential current elements, Force between differential current elements. Magnetisation and permeability, Magnetic boundary conditions, The magnetic circuit, **Potential** energy and forces on magnetic materials, inductance and mutual reactance

RBT Levels: L1, L2, L3.

UNIT-IV

Faraday's law of Electromagetic induction: Integral form and differential form, Displacement current, Conduction current, Maxwell's equations integral form and differential form.

Uniform Plane Wave: Derivation of plane wave equations from Maxwell's equations, Solution of wave equation for perfect dielectric. Wave propagation in free space, wave propagation in good conductor, skim depth or depth of penetration. **RBT Levels: L1, L2, L3.**

TEXT BOOKS

1. W. H. Hayt and J.A. Buck, - Engineering Electromagnetics, 8th Edition, Tata McGraw Hill, 2014, ISBN-978-93-392-0327-6.

REFERENCE BOOKS

1. Mathew N.O., Sadiku, - Elements of Electromagnetics, Oxford Press University, 4th Edition
2. N. Narayana Rao, - Fundamentals of Electromagnetics for Engineering, Pearson

ONLINE RESOURCES

1. https://ocw.mit.edu
2. https://nptel.ac.in

COURSE ASSESSMENT

A. Continuous Assessment (Weightage **30 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage
- Remaining 10 marks will be given for Assignments (Four Assignments will be given with one each from respective units).

B. **End Sem Examination** (Weightage **45 Marks**)

- One full question carries 11/12 Marks. Full question may be divided further into sub questions.
- There will be two full questions from each unit and a total of EIGHT FULL QUESTIONS.
- Student has to answer FOUR FULL QUESTIONS one from each unit i.e., Answering one full question from each unit is mandatory.

CONTROL SYSTEMS

Semester	**:**	**IV**	**Internal Assessment**	**:**	**30**
Course Code	**:**	**UECTCC4004**	**End Sem. Exam**	**:**	**45**
Teaching Hours/Week (L:T:P)	**:**	**3:1:0**	**Exam Duration (Hours)**	**:**	**2.5**
Credits: 03					

PREREQUSITES

Exposure to various Signals.

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Develop the mathematical model of Mechanical and Electrical systems.

CO2. Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method.

CO3. Determine the time domain specifications for first and second order systems.

CO4. Determine the stability of a system in the time domain using Routh-Hurwitz criterion.

CO5. Determine the stability of a system in the frequency domain using Nyquist and Bode plots.

UNIT-I

Introduction: Types of control system, Effect of feedback system, Differential equation of physical systems –Mechanical systems, Electrical systems, Electromechanical systems, Analogous systems.

RBT Levels: L1, L2, L3.

UNIT-II

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

Time Response of feedback control systems: Standard test signals, Unit step response of First and Second order Systems. **RBT Levels: L1, L2, L3.**

UNIT-III

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).

Stability Analysis: Concept of stability, necessary conditions for stability, Routh stability criterion, Introduction to Root-Locus Techniques, the root locus concepts, construction of rootloci **RBT Levels: L1, L2, L3.**

UNIT-IV

Frequency domain analysis and Stability: Correlation between time and frequency response, Bode plots, Experimental determination of transfer function. Introduction to lead, lag and lead-lag compensating network (excluding design).

Introduction to state variable analysis: Concept of state, state variable and state models for electrical systems, solution of state equations. **RBT Levels: L1, L2, L3.**

TEXT BOOKS

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

REFERENCE BOOKS

1. Benjamin, C. Kuo -Automatic Control Systems, John Wily India PVT. Ltd., 8th Edition, 2008.
2. K. Ogata, - Modern Control Engineering, Pearson Education Asia / PHI, 4th Edition, 2002,

ONLINE RESOURCES

1. www.teoma.co.uk
2. https://ieeexplore.ieee.org

COURSE ASSESSMENT

A. **Continuous Assessment (**Weightage **30 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage
- Remaining 10 marks will be given for Assignments (Four Assignments will be given with one each from respective units).

B. **End Sem Examination** (Weightage **45 Marks**)

- One full question carries 11/12 Marks. Full question may be divided further into sub questions.
- There will be two full questions from each unit and a total of EIGHT FULL QUESTIONS.
- Student has to answer FOUR FULL QUESTIONS one from each unit i.e., Answering one full question from each unit is mandatory.

MICROPROCESSOR AND MICROCONTROLLER LAB

Semester	**:**	**IV**	**Internal Assessment**	**:**	**20**
Course Code	**:**	**UECPCC4005**	**End Sem. Exam**	**:**	**30**
Teaching Hours/Week (L:T:P)	**:**	**0:0:3**	**Exam Duration (Hourse)**	**:**	**3**
Credits: 02					

PREREQUSITES

Microprocessor and Microcontroller theoretical concepts

COURSE OUTCOMES

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

CO1. Implement assembly language programs for 8085 and 8051.
CO2. Interfacing and testing various interface various IO devices with 8051.
CO3. Interfacing and testing various interface various IO devices with Atmega328P.
CO4. Interfacing and testing various interface various IO devices with Arduino platform

8085 / 8086 Assembly programming: RBT Levels: L1, L2, L3, L4.

1. Basic arithmetic and Logical operations
2. Various addressing modes
3. Data movements programs
4. Code conversion (decimal, binary, octal and hex).
5. Floating point operations, string manipulations, sorting and searching
6. Subroutines and ISRs

8051 Assembly Programming: RBT Levels: L1, L2, L3, L4.

1. Basic arithmetic and Logical operations
2. Bit addressable operations (Internal Memory)
3. Code conversion, decimal arithmetic and Matrix operations.
4. Counters and Time Delay
5. Subroutines and ISRs
6. Interfacing IO devices (Switches, LEDs)

Assembly Programming AVR: RBT Levels: L1, L2, L3, L4.

1. Basics data Operations
2. Various addressing modes
3. Counters and Time Delay
4. Subroutines and ISRs
5. Interfacing IO devices (Switches, LEDs)
6. Mixing C and Assembly

TEXT BOOKS

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 6th Edition, Penram International Publishing.
2. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition 2006.
3. Kenneth.J.Ayala. The 8051 microcontroller, 3rd edition, Cengage learning,2010
4. Muhammad Ali Mazidi , Janice Gillispie Mazidi and Rolin D McKinlay, The 8051 microcontroller and embedded systems using assembly and C, second edition Pearson education Asia

COURSE ASSESSMENT

A. **Continuous Assessment (**Weightage **20 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage

B. **End Sem Examination** (Weightage **30 Marks**)

- An experiment will be allotted and the same has to be designed and performed by the student. For designing (theory part) 15 marks will be given and remaining 15 will be given for performing the experiment and showing the output.

ANALOG COMMUNICATION ENGINEERING LAB

Semester	**:**	**IV**	**Internal Assessment**	**:**	**20**
Course Code	**:**	**UECPCC4006**	**End Sem. Exam**	**:**	**30**
Teaching Hours/Week (L:T:P)	**:**	**0:0:3**	**Exam Duration (Hours)**	**:**	**3.0**
Credits: 02					

PREREQUSITES

Exposure to analog communication engineering course.

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO1. Design AM modulation and demodulation

CO2. Apply basics of AM to design AM-DSB, and SSB systems.

CO3. Design FM modulation and demodulation.

CO4. Analyze Pre emphasis and de-emphasis systems.

CO5. Understand the working of PLL.

LIST OF EXPERIMENTS

1. Amplitude modulation using transistor/FET (Generation and detection). **RBT Level: L1 to L6**
2. Amplitude demodulation diode/envelop detector. **RBT Level: L1 to L6**
3. Frequency modulation using IC 8038/2206 **RBT Level: L1 to L6**
4. Frequency demodulation. **RBT Level: L1 to L6**
5. Pre emphasis and de-emphasis **RBT Level: L1 to L4**
6. DSBSC generation using Balance Modulator IC 1496/1596. **RBT Level: L1 to L4**
7. SSB Modulation and demodulation. **RBT Level: L1 to L4**
8. Frequency synthesis using PLL. **RBT Level: L1 to L4**

TEXT BOOKS

1. Simon Haykins & Moher, Communication Systems, 5th Edition, John Willey, India Pvt. Ltd, 2010.
2. Simon Haykins & Moher, *An Introduction to Analog and Digital Communication*, John Wiley India Pvt. Ltd., 2012.

REFERENCE BOOKS

1. H. Taub, D. Schilling and G. Saha, Principles of Communications, Mc-Graw Hill India, 2017.
2. B. P. Lathi, Modern digital and Analog Communication systems Oxford University Press., 4th Edition, 2010.

COURSE ASSESSMENT

A. Continuous Assessment (Weightage **20 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage

B. **End Sem Examination** (Weightage **30 Marks**)

- An experiment will be allotted and the same has to be designed and performed by the student. For designing (theory part) 15 marks will be given and remaining 15 will be given for performing the experiment and showing the output.

OPERATING SYSTEM LAB

Semester :	**IV**	**Internal Assessment** :	**20**
Course Code :	**UECPCC4007**	**End Sem. Exam** :	**30**
Teaching Hours/Week (L:T:P) :	**0:1:2**	**Exam Duration (Hourse)** :	**03**
Credits: 02			

PREREQUSITES

General purpose Operating system, Basic computer operation and Exposure to "C" programming.

COURSE OUTCOMES

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

CO1. Work on Linux platform using "C" language.
CO2. Implement various CPU Scheduling Algorithms
CO3. Implement Deadlock avoidance and Detection Algorithms
CO4. Implement Semaphores
CO5. Create processes and implement IPC
CO6. Implement File Organization and File Allocation Strategies

Shell programming: RBT Levels: L1, L2, L3, L4.

1. Basics of UNIX commands
2. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to simulate UNIX commands like cp, ls, grep, etc.
4. Simple Shell Programming

CPU Scheduling Algorithms: RBT Levels: L1, L2, L3, L4.

1. C programs to implement the various CPU Scheduling Algorithms
   a. First Come First Serve
   b. Shotest Job First
   c. Round Robin

Process Creation and IPC: RBT Levels: L1, L2, L3, L4.

1. C programs to implement process creation
2. C program for IPC

Deadlock Detection Algorithms: RBT Levels: L1, L2, L3, L4.

1. Implementation of Semaphores
2. Implementation of Shared memory and IPC
3. Bankers Algorithm for Deadlock Avoidance

File Allocation Strategies: RBT Levels: L1, L2, L3, L4.

1. Implementation of the various File Organization Techniques

TEXT BOOKS

1. Hoover, System Programming with C and Unix, Pearson Education, 2009, ISBN: 9788131729502
2. Robert Love, Linux System Programming: Talking Directly to the Kernel and C Library, O'Reilly Media, 2013, ISBN: 9781449341541

COURSE ASSESSMENT

A. **Continuous Assessment (**Weightage **20 Marks)**

- Two continuous assessments will be conducted with each one of 10 marks weightage

B. **End Sem Examination** (Weightage **30 Marks**)

- An experiment will be allotted and the same has to be designed and performed by the student. For designing (theory part) 15 marks will be given and remaining 15 will be given for performing the experiment and showing the output.