B.Tech
II Year I Semester

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES:: TIRUPATI
AUTONOMOUS
AK 19 Regulations

Year : II **Semester** : I **Branch of Study :** ECE and EEE

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19ABS9912	Transform Techniques and Complex Variables.	3	0	0	3

Course Outcomes:

CO1: Find the differentiation and integration of complex functions used in engineering problems
CO2: Apply the Laplace transform for solving differential equations (continuous systems)
CO3: Find the Fourier series of periodic signals
CO4: Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
CO5: Develop Z transform techniques for discrete time systems

Unit I : Laplace transforms

Definition of Laplace transform, existence conditions, properties of Laplace transforms, inverse Laplace transforms, transforms of derivatives, transforms of integrals, multiplication by t^n, division by t, convolution theorem, periodic functions, unit step function, unit impulse function, applications to ordinary differential equations. (Without proofs)

Unit II: Fourier series

Dirichlet‟s conditions, Fourier series, conditions for a Fourier expansion, functions of any period, odd and even functions - half range series.

Unit III: Fourier transforms

Fourier integrals, Fourier cosine and sine integrals, Fourier transform, sine and cosine transform, properties, convolution theorem

Unit IV: Z-Transforms

Definition of Z-transform, elementary properties, linearity property, damping rule, shifting u_n to the right and left, multiplication by n, initial value theorem, final value theorem, inverse Z-transform, convolution theorem, formation of difference equations, solution of difference equations using Z- transforms.

Unit V : Complex Variables

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate. Complex integration, Cauchy theorem (without proof), Cauchy integral formula (without proof), Taylor‟s series, zeros of analytic functions, singularities, Laurent‟s series, residues, Cauchy residue theorem (without proof).

Textbooks:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

References:

1. Dr.T.K.V Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N Prasad, Mathematics – II, S.Chand publications.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.
3. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India,1995.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, Mc-Graw Hill, 2004.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO2 : Analyse complex engineering problems	2.1	2.1.3
CO2	PO1:Apply the knowledge of mathematics	1.1	1.1.2
CO3	PO1: Apply the knowledge of mathematics	1.1	1.1.2
CO4	PO1: Apply the knowledge of mathematics	1.1	1.1.2
CO5	PO1: Apply the knowledge of mathematics	1.1	1.1.2

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Year : II **Semester** : I **Branch of Study :** ECE

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
19AES0509	Basics of Python Programming	2	0	0	2

Course Outcomes:

Student should be able to

CO1: Apply the features of Python language in various real applications.
CO2: Select appropriate data structure of Python for solving a problem.
CO3: Design object-oriented programs using Python for solving real-world problems.
CO4: Apply modularity to programs.
CO5: Select appropriate classes and functions of Python for solving a problem.

Unit – I

Introduction: What is a program, Running python, Arithmetic operators, Value and Types. Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.

Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

Unit – II

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Conditionals and Recursion: floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.

Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types.

Unit – III

Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms. Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

Case Study: Reading word lists, Search, Looping with indices.

Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

Unit – IV

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables. Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Unit – V

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning

Classes and Methods: Object oriented features, Printing objects, The init method, Thestrmethod, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

The Goodies: Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, defaultdict, Named tuples, Gathering keyword Args.

Text books:

1. Allen B. Downey, “Think Python”, 2nd edition, SPD/O‟Reilly, 2016.

Reference Books:

1. Martin C.Brown, “The Complete Reference: Python”, McGraw-Hill,2018.
2. Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE,2015.
3. R. Nageswara Rao, “Core Python Programming”, 2nd edition, Dreamtech Press,2019

COs	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO 5: Modern tool usage	5.1	5.1.1
CO2	PO 5: Modern tool usage	5.2	5.2.1
CO3	PO 4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO 3: Design/Development of solutions	3.4	3.4.1
CO5	PO 6: The engineer and society	6.1	6.1.1

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Year : II **Semester** : I **Branch of Study :** ECE

Subject Code:19AES0505	**Subject Name: Internet of Things**	**L T P** **2 0 0**	**Credits:2**

Course Outcomes:
CO1: Interpret the vision of IoT from a globalcontext.
CO2: Determine the Market perspective ofIoT.
CO3: Compare and Contrast the use of Devices, Gateways and Data Management inIoT.
CO4: Implement state of the art architecture inIoT.
CO5: Illustrate the application of IoT in Industrial Automation and identify Real World Design Constraints.

Unit-I

M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.

Unit-II

M2M to IoT - A Market Perspective- Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview- Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Unit-III

M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

Unit-IV

IoT Architecture-State of the Art - Introduction, State of the art.

Unit-V

IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. Industrial Automation- Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things

TEXT BOOK:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.(ISBN-13:978-0124076846)

REFERENCE BOOKS / WEBLINKS:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014. (ISBN-13:978-8173719547)

2. Francis daCosta, "Rethinking the Internet of Things: A ScaLaboratoryle Approach to Connecting Everything", 1st Edition, Apress Publications, 2013. (ISBN-13: 978-1430257400)

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 5: Modern Tool Usage	5.1	5.1.1
CO: 2	PO 5: Modern Tool Usage	5.2	5.2.1
CO: 3	PO 4: Conduct investigations of complex problems	4.3	4.3.1
CO: 4	PO 3: Design/Development of Solutions	3.4	3.4.1
CO: 5	PO 6: Engineer & Society	6.1	6.1.1

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Year: II Semester: I Branch of Study: ECE

Course Code	Course Title	L	T	P	Credits
19APC0401	Electronic Devices and Circuits	3	0	0	3

Course Outcomes: Students will be able to
CO1: Understand the operation of diodes and special electronic devices. CO2: Know operation of different rectifiers without and filters.
CO3: Understand construction, operation of BJT, FET in different configurations CO4: Know the need of biasing and design of DC biasing circuits.
CO5: Design of amplifiers with BJTs and FETs by using small signal model

Unit I: PN Junction Diode & Special Diode Characteristics
Review of semiconductor Physics n and p-type semiconductors, Intrinsic &Extrinsic Semiconductors and their Fermi Levels, Open circuited p-n junction, Biased p-n junction, Current components in PN junction Diode, Diode Equation, V-I characteristics of p-n junction diode, Temperature dependence on V-I characteristics, Diode resistance, Diode capacitance.
Special Electronic Devices - Construction, Operation, V-I Characteristics of
Zener diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel diode, DIAC, TRIAC, SCR, UJT
Unit II: Rectifiers & Filters
Introduction to DC Power supply , Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, derivations of rectifier parameters , Rectifier circuits-Operation, Input and Output waveforms, Filters, , Capacitor filter, Inductor filter , L-section filter, π-section filter, Multiple L-section and Multiple π section filter, comparison of various filter circuits in terms of ripple factors.
Unit III: Transistor Characteristics
BJT: Bi-polar Junction Transistor, Ebers-Moll model of a transistor, Transistor current components, Transistor as an amplifier, Transistor equation, Transistor configurations, Input- Output Characteristics of Transistor in Common Base, Common Emitter and Common Collector configurations, Punch through-Reach through, Photo transistor, Typical transistor junction voltage values.

FET: BJT Versus FET,Junction Field Effect TransistorJFET Types, Construction, Operation, parameters, Drain and Transfer characteristics, MOSFET Types -Enhancement and Depletion Types-Construction, Operation, Characteristics.
Unit IV: Transistor Biasing & Thermal Stabilization
Need for biasing, operating point, Load line analysis, BJT biasing-Methods, Basic stability Fixed bias, Collector to base bias, Self-bias, Stabilization against variations in V_{BE}, I_C, and β, stability factors, (S, S‟, S”), Bias compensation, Thermal runaway, Thermal stability.
FET Biasing- methods and stabilization.
Unit V: Small Signal Low Frequency Transistor Amplifier Models
BJT: Two port network, Transistor hybrid model, determination of h-parameters, generalized analysis of transistor amplifier model using h-parameters, analysis of CB, CE and CC amplifiers using exact analysis, approximate hybrid model, analysis of CB, CE and CC amplifiers using approximate hybrid model, Comparison of transistor amplifiers.
FET: Generalized analysis of small signal model, analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.
Text Books:
1. David A.Bell, “Electronic Devices and circuits”,5th edition, Oxford university press 2015.
2. Thomas L.Floyd, “Electronic Devices”, 9th edition, Pearson Education, 2013
3. Robert L.Boylestad and Louis Nashelsky, “Electronic Devices & circuit theory”, Pearson Education, 11th Edition 2013.
Reference Books:
1. Donald Neamen, “Electronic Circuits: Analysis and Design”, 3 rd edition, McGraw-Hill Education,

2011.
2. Muhammad Rashid, “Microelectronic Circuits: Analysis & Design”, 2nd edition, Cengage Learning,2010.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO2	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO3	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO4	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO5	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1

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Year: II Semester: I Branch of Study: ECE

Course Code	Course Title	L	T	P	Credits
19APC0402	Electromagnetic Theory and Transmission Lines	3	0	0	3

Course Outcomes: Students will be able to
CO1: Understand basic laws of electric fields and Solve problems related to electric fields. CO2: Apply laws of magnetic fields and Solve problems related to magnetic fields.
CO3: Analyze electric and magnetic fields at the interface of different media and derive Maxwell‟s equations for static and time varying fields.
CO4: Proficient with analytical skills for understanding propagation of electromagnetic waves in different media.
CO5: Understand the concept of transmission lines & their applications.

Unit I:
Coulomb‟s Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell‟s Two Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson‟s and Laplace‟s Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

Unit II:
Biot-Savart Law, Ampere‟s Circuital Law and Applications, Magnetic Flux Density, Maxwell‟s Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere‟s Force Law, Inductances and Magnetic Energy, Illustrative Problems.

Unit III:
Faraday‟s Law and Transformer e.m.f, Inconsistency of Ampere‟s Law and Displacement Current Density, Maxwell‟s equations for time varying fields, Maxwell‟s Equations in Different Final Forms and Word Statements. Boundary Conditions of Electromagnetic fields: Dielectric- Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

Unit IV:
Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization. Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector, and Poynting Theorem – Applications, Power Loss in a Plane Conductor, Illustrative Problems.

Unit V:
Transmission Lines: Introduction, Concept of distributed elements, Equations of voltage and current, Standing waves and impedance transformation, Lossless and low-loss transmission lines, Power transfer on a transmission line, Analysis of transmission line in terms of admittances, Transmission line calculations with the help of Smith chart, Applications of transmission line, Impedance matching using transmission lines.

Text Books:
1. Matthew N.O. Sadiku, “Elements of Electromagnetics”, Oxford Univ. Press, 4th ed., 2008.
2. William H. Hayt Jr. and John A. Buck, “Engineering Electromagnetics”, TMH, 7th ed., 2006.
3. John D. Krauss, “Electromagnetics”, McGraw- Hill publications.

References:

4. Electromagnetics, Schaum‟s outline series, Second Edition, Tata McGraw-Hill publications, 2006.
5. E.C. Jordan and K.G. Balmain, “Electromagnetic Waves and Radiating Systems”, PHI, 2nd 4. Edition, 2000.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.3	1.3.1
		1.4	2.3.1
CO2	PO 3: Design/Development of solutions	3.1	3.1.1
CO3	PO 3: Design/Development of solutions	3.1	3.1.1
CO4	PO 3: Design/Development of solutions	3.1	3.1.1
	PO 4: Conduct investigations of complex problems	4.3	4.3.2
			4.3.3
CO5	PO 3: Design/Development of Solutions	3.1	3.1.1

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Year: II **Semester: I** **Branch of Study: ECE**

Course Code	Course Title	L	T	P	Credits
19APC0403	Signals and Systems	3	1	0	4

Course Outcomes: Students will be able to
CO1. Understand mathematical description and representation of continuous time and discrete time signals.
CO2: Resolve signals in frequency domain using Fourier series and Fourier Transforms. CO3: Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
CO4: Understand the properties of systems, response of LTI systems and filters. CO5: Able to analyze LTI systems using Laplace and Z-Transforms.

Unit I: Signals
Introduction: Definition of Signals, classification of signals: continuous time and discrete time signals, standard signals: impulse function, step function, ramp function complex exponential and sinusoidal signals, signum and sinc functions. Operations on signals and sequences. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, mean square error, orthogonality of complex functions. Representation of signals using Fourier series: Trigonometric Fourier series (TFS) and complex exponential Fourier series (CEFS). Illustrative problems.

Unit II:Fourier Transforms
Continuous Time Fourier Transform, definition, properties, Fourier Transforms of standard signals, complex Fourier spectrum, inverse Fourier Transform. Discrete Time Fourier Transform, definition, properties of Discrete Time Fourier Transform transforms of standard signals. Introduction to Hilbert Transform. Illustrative problems.

Unit III:Sampling Theorem
Definition of sampling, types: impulse and pulse sampling. Sampling theorem for band limited signals-Graphical and analytical proof, Nyquist criterion, Reconstruction of signal from its samples, effect of under sampling – Aliasing. Sampling theorem for bandpass signals. Illustrative problems.

Unit IV: Systems
Definition of Systems, Classification of Systems, impulse response, response of a linear time invariant system, Convolution and correlation: time domain, frequency domain and Graphical representation. Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time. Illustrative problems.

Unit V: Laplace Transforms & Z Transform
Laplace transforms: Review of Laplace transforms, concept of Region of Convergence (ROC) for Laplace transforms, inverse Laplace transform, constraints on ROC for various classes of signals, properties of Laplace Transforms. Analysis of CT-LTI systems using Laplace transforms: causality and stability.
Z-Transforms: Review of Z-Transforms, concept of Region of Convergence (ROC) for Z- transforms inverse Z- transform, partia and constraints on ROC for various classes of signals, properties of Z-Transforms. Analysis of DT-LTI systems using Z- transforms: causality and stability. Illustative problems.

Text Books:
1. B.P. Lathi, Signals, Systems & Communications, BS Publications, 2003.
2. A.V. Obppenheim, A.S. Willsky and S.H. Nawab, Signals and Systems PHI, 2nd Edition. 2009.

References:
1. Simon Haykin and Van Veen, Signals & Systems, Wiley, 2nd Edition.
2. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms,and Applications, 4 th Edition, PHI, 2007.

3. BP Lathi, Principles of Linear Systems and Signals Oxford University Press, 2015.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.3	1.3.1
	PO 3: Design/Development of Solutions	3.3	3.3.1
			3.3.2
	PO 4: Conduct investigations of complex problems	4.3	4.3.1
			4.3.2
			4.3.3.
			4.3.4
	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2
CO2	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.4	2.4.1
			2.4.2
			2.4.3
	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2
CO3	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2
	PO 10: Communication	10.3	10.3.1
			10.3.2
CO4	PO 4: Conduct investigations of complex problems	4.2	4.2.1
			4.2.2
		4.3	4.3.1
			4.3.2
			4.3.3
			4.3.4
CO5	PO 3: Design/Development of solutions	3.3	3.3.1
			3.3.2
	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2

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Year: II B.Tech **Semester: I** **Branch: Common to All**

Subject Code 19AMC9903	Subject Name Environmental Studies	L 2	T 0	P 0	Credits 0

Course Outcomes

1. Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
2. Students realize the need to change their approach, so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
3. Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
4. . Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage
5. To get knowledge on various environmental acts and to engage all the students life - long learning of rain water harvesting

UNIT – I **18Hr**

Multidisciplinary Nature ofEnvironmental Studies: Introduction Multidisciplinary Nature of Environmental Studies Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable energy resources –Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and sub-surface – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.

Energy resources: Renewable and non-renewable energy resources.

UNIT – II **20Hr**

Ecosystems: Concept of an ecosystem. – Structure and functions of anecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity And Its Conservation : Introduction- Definition:genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation

– Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III **10Hr**

Environmental Pollution: Definition, Causes, effects and its controlmeasures of : Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards.

Solid Waste Management: Causes**,** effects and control measures ofurban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone, Tsunami and landslides.

UNIT – IV **15Hr**

Social Issues and the Environment: From Unsustainable toSustainable development – Urban problems related to energy – Water conservation, rain water harvesting and watershed management – Resettlement

and rehabilitation of people Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies– Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act Publicawareness.

UNIT – V **10Hr**

Human Population and the Environment: Population growth,variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

TEXT BOOKS:

1. Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Kaushik, New Age Publishers.
3. Environmental Studies by Sri Krishna Hitech publishing Pvt. Ltd.

REFERENCES:

1. Environmental studies by R.Rajagopalan, Oxford University Press.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.
4. Environmental studies by A. Ravi Krishnan, G. Sujatha Sri Krishna Hitech publications.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO:1	PO1:Apply the knowledge of Basic science	1.2	1.2.1
CO:2	PO1:Apply the knowledge of Basic science	1.2	1.2.1
CO:3	PO1:Apply the knowledge of Basic science	1.2	1.2.1
CO:4	PO1:Apply the knowledge of Basic science	1.2	1.2.1
CO:5	PO1:Apply the knowledge of Basic science	1.2	1.2.1

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Year: II B.Tech **Semester: I** **Branch: Common to All**

Subject Code 19AES0510	Subject Name Basics of Python Programming Laboratory	L T P 0 0 2	Credits 1

Course Objectives:

To train the students in solving computational problems

To elucidate solving mathematical problems using Python programming language

To understand the fundamentals of Python programming concepts and its applications To understand the object-oriented concepts using Python in problem solving.

Laboratoryoratory Experiments

1. Install Python Interpreter and use it to perform different Mathematical Computations. Try to do all the operations present in a ScientificCalculator

2. Write a function that draws a grid like thefollowing**:**

```
+ - - - - + - - -
      - +
   ||          |
   ||          |
   ||          |
   ||          |
+ - - - - + - - -
      - +
   ||          |
   ||          |
   ||          |
   ||          |
+ - - - - + - - -
      - +
```

3. Write a function that draws a Pyramid with #symbols #

```
#                              #        #
#                          # # # #
#    #                       # # # # #
```

Up to 15 hashes at the bottom

4. Using turtles concept draw a wheel of yourchoice

5. Write a program that draws ArchimedeanSpiral

6. The letters of the alphabet can be constructed from a moderate number of basic elements, like vertical and horizontal lines and a few curves. Design an alphabet that can be drawn with a minimal number of basic elements and then write functions that draw the letters. The alphabet can belong to any Natural language excluding English. You should consider at least Ten letters of thealphabet.

7. The time module provides a function, also named time that returns the current Greenwich Mean Time in “the epoch”, which is an arbitrary time used as a reference point. On UNIX systems, the epoch is 1 January1970.

```
>>> import time
>>>time.time() 1437746094.5735
958
```

Write a script that reads the current time and converts it to a time of day in hours, minutes, and seconds, plus the number of days since the epoch.

8. Given n+r+1 <= 2r . n is the input and r is to be determined. Write a program which computes minimum value of r that satisfies theabove.

9. Write a program that evaluates Ackermannfunction

10. The mathematician Srinivasa Ramanujan found an infinite series that can be used to generate a

numerical approximation of 1/ **π**:
Write a function called estimate_pi that uses this formula to compute and return an estimate of **π.**

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

It should use a while loop to compute terms of the summation until the last term is smaller than $1e^{-15}$ (which is Python notation for 10^{-15}). You can check the result by comparing it to math.pi.

11. Choose any five built-in string functions of C language. Implement them on your own in Python. You should not use string related Python built-infunctions.
12. Given a text of characters, Write a program which counts number of vowels, consonants and special characters.
13. Given a word which is a string of characters. Given an integer say „n", Rotate each character by „n" positions and print it. Note that „n" can be positive ornegative.
14. Given rows of text, write it in the form ofcolumns.
15. Given a page of text. Count the number of occurrences of each latter (Assume case insensitivity and don"t consider special characters). Draw a histogram to represent thesame
16. Write program which performs the following operations on list"s. Don"t use built-infunctions

a) Updating elements of alist
b) Concatenation oflist"s
c) Check for member in thelist
d) Insert into thelist
e) Sum the elements of thelist
f) Push and pop element oflist
g) Sorting oflist
h) Finding biggest and smallest elements in thelist
i) Finding common elements in thelist

17. Write a program to count the number of vowels in aword.
18. Write a program that reads a file, breaks each line into words, strips whitespace and punctuation from the words, and converts them tolowercase.
19. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of- copyright book in plain text format. Read the book you downloaded, skip over the header information at the beginning of the file, and process the rest of the words as before. Then modify the program to count the total number of words in the book, and the number of times each word is used. Print the number of different words used in the book. Compare different books by different authors, written in differenteras.
20. Go to Project Gutenberg (http://gutenberg.org) and download your favorite out-of- copyright book in plain text format. Write a program that allows you to replace words, insert words and delete words from thefile.
21. Consider all the files on your PC. Write a program which checks for duplicate files in your PC and displays their location. Hint: If two files have the same checksum, they probably have the samecontents.
22. Consider turtle object. Write functions to draw triangle, rectangle, polygon, circle and sphere. Use object oriented approach.
23. Write a program illustrating the object oriented features supported byPython.
24. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorizing them into distinction, first class, second class, third class andfailed.
25. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap yearrules.
26. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <=59)

Laboratory Outcomes:
Student should be able to
Design solutions to mathematicalproblems. Organize the data for solving theproblem.

Develop Python programs for numerical and text basedproblems. Select appropriate programming construct for solving theproblem. Illustrate object orientedconcepts.

Reference Books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rdedition, AvaiLaboratoryle at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O"Reilly,2016
3. DainelY.Chen "Pandas for Everyone Python Data Analysis" Pearson Education,2019

COs	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO 5: Modern tool usage	5.1	5.1.1
CO2	PO 5: Modern tool usage	5.2	5.2.1
CO3	PO 4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO 3: Design/Development of solutions	3.4	3.4.1
CO5	PO 6: The engineer and society	6.1	6.1.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES: TIRUPATI
(Autonomous) AK19 Regulations

Year: II **Semester**: **I** **Branch of Study: ECE**

Course Code	Course Title	L	T	P	Credits
19APC0404	Electronic Devices and Circuits Laboratory	0	0	2	1

Course Outcomes: Students will be able to

CO1: Test and operate diodes and special electronic devices. CO2: Construct and operate rectifiers without and with filters CO3: Construct and operate BJT, FET in different configurations CO4: Design DC biasing circuits for Transistors

CO5: Design amplifiers using BJTs and FETs.

List of Experiments:

1. PN Junction Diode Characteristics
2. Zener Diode Characteristics and Zener Diode as Voltage Regulator.
3. Rectifiers (With and Without Filter).
4. BJT Characteristics (CB Configuration).
5. BJT Characteristics (CE Configuration).
6. FET Characteristics (CS Configuration).
7. SCR Characteristics
8. Transistor Biasing
9. BJT-CE Amplifier
10. Emitter Follower-CC Amplifier 11.FET-CS Amplifier

12.UJT Characteristics

Equipment required for Laboratoryoratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO2	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO3	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO4	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1
CO5	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
	PO 3: Design/Development of solutions	3.3	3.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES: TIRUPATI
(Autonomous) AK19 Regulations

Year: II **Semester**: **I** **Branch of Study: ECE**

Course Code	Course Title	L	T	P	Credits
19AES0506	Internet of Things (IoT) Laboratory	0	0	2	1

Course Outcomes: Students will be able to
CO1: Choose the sensors and actuators for an IoT application. CO2: Select protocols for a specific IoT application
CO3: Utilize the cloud platform and APIs for IoT application.
CO4: Experiment with embedded boards for creating IoT prototypes. CO5: Design a solution for a given IoT application.

Laboratory of Experiments:

1. Select any one development board (Eg., Arduino or Raspberry Pi) and control LED using the board.
2. Using the same board as in (1), read data from a sensor. Experiment with both analog and digital sensors.
3. Control any two actuators connected to the development board using Bluetooth.
4. Read data from sensor and send it to a requesting client. (using socket communication) Note: The client and server should be connected to same local area network.
5. Create any cloud platform account, explore IoT services and register a thing on the platform.
6. Push sensor data to cloud.
7. Control an actuator through cloud.
8. Access the data pushed from sensor to cloud and apply any data analytics or visualization services.
9. Create a mobile app to control an actuator.
10. Identify a problem in your local area or college which can be solved by integrating the things you learned so far and create a prototype to solve it (Mini Project).

Text Book:

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012

References:

1. ArshdeepBahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

Additional Sources: https://www.arduino.cc/ https://www.raspberrypi.org/

COs	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO 5: Modern tool usage	5.1	5.1.1
CO2	PO 5: Modern tool usage	5.2	5.2.1
CO3	PO 4: Conduct investigations of complex problems	4.3	4.3.1
CO4	PO 3: Design/Development of solutions	3.4	3.4.1
CO5	PO 6: The engineer and society	6.1	6.1.1

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Year: II **Semester**: **I** **Branch of Study: ECE**

Course Code	Course Title	L	T	P	Credits
19APC0405	Signals and Systems Laboratory	0	0	3	1.5

Course Outcomes: Students will be able to
CO1: Understand basics of MATLABORATORY syntax, functions and programming.
CO2: Generate and characterize various signals and perform the basic operations.
CO3: Design and analyze linear time-invariant (LTI) systems and compute its response. CO4: Analyze the spectral characteristics of signals using Fourier analysis.
CO5: Analyze the systems using Laplace transform and Z-transform.

List of Experiments:

1. Write program to generate Standard Signals/Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
2. Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Write program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings. Plot the discrete spectrum of the signal.
4. Write program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.
5. Write program to convolve two discrete time sequences. Plot all the sequences.
6. Write program to find autocorrelation and cross correlation of sequences.
7. Write program to verify Linearity and Time Invariance properties of a given Continuous/Discrete System.
8. Write program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
9. Write program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
10. Write program to find response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
11. Write program for removal of noise by Autocorrelation / Cross correlation
12. Write a program for waveform Synthesis using Laplace Transform and To plot pole-zero diagram in S-plane / Z-plane of given signal/sequence

Note: All the experiments are to be simulated using MATLABORATORY or equivalent software

Text Books:

B.P. Lathi, Linear Systems and Signals, 2nd Edition, Oxford University Press, India. Barry Van Veen& Simon Haykin "Signals and Systems, 2 nd Edition" Willey Publishers
Oppenheim, Alan S. Willsky, S. Hamid Nawab, "Signals and Systems". 2nd Edition, PHI, India.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO 1: Engineering knowledge	1.3	1.3.1
	PO 3: Design/Development of Solutions	3.3	3.3.1
			3.3.2
	PO 4: Conduct investigations of complex problems	4.3	4.3.1
			4.3.2
			4.3.3.
			4.3.4
	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2
CO2	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.4	2.4.1
			2.4.2
			2.4.3
	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2
CO3	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2
	PO 10: Communication	10.3	10.3.1
			10.3.2
CO4	PO 4: Conduct investigations of complex problems	4.2	4.2.1
			4.2.2
		4.3	4.3.1
			4.3.2
			4.3.3
			4.3.4
CO5	PO 3: Design/Development of solutions	3.3	3.3.1
			3.3.2
	PO 5: Modern tool usage	5.2	5.2.1
			5.2.2