

**B.Tech**  
**II Year II Semester**

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES:: TIRUPATI  
AUTONOMOUS**

**AK 19 Regulations**

**Year : II**

**Semester : II**

**Branch of Study : ECE**

<b>Subject Code:</b> 19ABS9920	<b>Subject Name:</b> Probability and Random variables	L 3	T 0	P 0	<b>Credits:</b> 3
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**Course Outcomes:**

- 1) Able to know the fundamental concepts of Probability theory
- 2) Analyze continuous and discrete-time random processes
- 3) **Analyze the** concepts of a Random Variable and operations that may be performed on a single Random variable
- 4) Analyze the characterize probability models and function of random variables based on multiples random variables.
- 5) Understand the concepts of expected Value of a Function of Random Variables and Gaussian Random Variables

**UNIT I :PROBABILITY**

Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes,,Theorem, and Independent Events.

**UNIT II :THE RANDOM VARIABLE:**

Definition of a Random Variable, Conditions for a function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions and their Properties- Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh distributions.  
Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties.

**UNIT III: OPERATION ON ONE RANDOM VARIABLE –EXPECTATIONS:**

Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev,,s Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

**UNIT IV: MULTIPLE RANDOM VARIABLES:**

Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem (Proof not expected), Unequal, and Equal Distributions.

**UNIT V: OPERATIONS ON MULTIPLE RANDOM VARIABLES:**

Expected Value of a Function of Random Variables: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, linear Transformations of Gaussian Random Variables.

**Text Books:**

1. Peyton Z. Peebles, “Probability, Random Variables & Random Signal Principles”, TMH, 4th Edition, 2001.
2. Athanasios Papoulis and S. Unnikrishna Pillai, “Probability, Random Variables and Stochastic

Processes”,  
 PHI, 4th Edition, 2002.

**References:**

1. R.P. Singh and S.D. Sapre, “Communication Systems Analog & Digital”, TMH, 1995.
2. Henry Stark and John W.Woods, “Probability and Random Processes with Application to Signal Processing”, Pearson Education, 3rd Edition.
3. George R. Cooper, Clave D. MC Gillem, “Probability Methods of Signal and System Analysis”, Oxford, 3rd Edition, 1999.
4. S.P. Eugene Xavier, “Statistical Theory of Communication”, New Age Publications, 2003.
5. Probability Theory and Stochastic Processes-MallikarjunaReddy,cengage Learning

<b>List of COs</b>	<b>PO no. and keyword</b>	<b>Competency Indicator</b>	<b>Performance Indicator</b>
CO1	PO1: Apply the knowledge of mathematics	1.1	1.1.2
CO2	PO2: Identify, formulate, analyse complex engineering problems.	2.4	2.4.3
CO3	PO1: Apply the knowledge of mathematics	1.1	1.3.1
CO4	PO2: Identify, formulate, analyse complex engineering problems.	2.2	2.1.3
CO5	PO2: Identify, formulate, analyze complex engineering problems.	2.2	2.2.2

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES:: TIRUPATI  
(AUTONOMOUS)

AK 19 Regulations

B. Tech II Year

Semester : II

Branch : Common to all

Subject Code: <b>19AHS9903</b>	Subject Name: <b>Communicative English II</b>	<b>L T P 2 0 0</b>	Credits:2
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**Course Outcomes**

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

1. Prioritize information from reading texts after selecting relevant and useful points
2. Paraphrase short academic texts using suitable strategies and conventions
3. Make formal structured presentations on academic topics using PPT slides with relevant graphical elements
4. Participate in group discussions using appropriate conventions and language strategies
5. Prepare a CV with a cover letter to seek internship/ job
6. Collaborate with a partner to make presentations and Project Reports

**Syllabus**

**Unit 1**

**(10 hrs)**

**Listening :** Listening for presentation strategies and answering questions on the speaker, audience, and key points.

**Speaking:** Formal presentations using PPT slides without graphic elements.

**Reading:** Reading for presenting – strategies to select, compile and synthesize information for presentation; reading to recognize academic style.

**Writing:** Paraphrasing; using quotations in writing; using academic style - avoiding colloquial words and phrases.

**Grammar and Vocabulary:** Formal/academic words and phrases.

**Unit 2**

**(10 hrs)**

**Listening:** Following an argument/ logical flow of thought; answering questions on key concepts after listening to extended passages of spoken academic discourse.

**Speaking:** Formal presentations using PPT slides with graphic elements.

**Reading:** Understand formal and informal styles; recognize the difference between facts and opinions.

**Writing:** Formal letter writing and e-mail writing (enquiry, complaints, seeking permission, seeking internship); structure, conventions and etiquette.

**Grammar and Vocabulary:** Phrasal prepositions; phrasal verbs.

**Unit 3**

**10(hrs)**

**Listening:** Identifying views and opinions expressed by different speakers while listening to discussions.

**Speaking:** Group discussion on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position.

**Reading:** Identifying claims, evidences, views, opinions and stance/ position.

**Writing:** Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences.

**Grammar and Vocabulary:** Language for different functions such as stating a point, expressing opinion, agreeing/disagreeing, adding information to what someone has stated, and asking for clarification.

**Unit 4:**

**(8 hrs)**

**Listening:** Understanding inferences; processing of information using specific context clues from the text.

**Speaking:** Group discussion; reaching consensus in group work (academic context).

**Reading:** Reading for inferential comprehension.

**Writing:** Applying for internship/ job - Writing one's CV/Resume and cover letter. **Grammar and**

**Vocabulary:** Active and passive voice – use of passive verbs in academic writing.

**Unit 5:**

**(8hrs)**

**Listening:** Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge.

**Speaking:** Formal team presentations on academic/ general topics using PPT slides.

**Reading for Writing:** Structure and contents of a Project Report; identifying sections in project reports; understanding the purpose of each section; significance of references.

**Grammar and Vocabulary:** Reinforcing learning; editing short texts; correcting common errors in grammar and usage.

**\*Course Materials would be compiled and provided to learners and teachers Reference Books**

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2<sup>nd</sup> Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012. Sample Web Resources  
Grammar/Listening/Writing 1-language.com <http://www.5minuteenglish.com/>  
<https://www.englishpractice.com/>

**Grammar/Vocabulary**

English Language Learning Online, <http://www.bbc.co.uk/learningenglish/>, <http://www.better-english.com/>, <http://www.nonstopenglish.com/>, <https://www.vocabulary.com/>, BBC Vocabulary Games, Free Rice Vocabulary Game

**Reading**

<https://www.usingenglish.com/comprehension/>, <https://www.englishclub.com/reading/short-stories.htm>, <https://www.english-online.at/>

**Listening**

<https://learningenglish.voanews.com/z/3613>, <http://www.englishmediaLaboratory.com/listening.html>

**Speaking**

<https://www.talkenglish.com/>, BBC Learning English – Pronunciation tips, Merriam-Webster – Perfect pronunciation Exercises

**All Skills**

<https://www.englishclub.com/>, <http://www.world-english.org/>, <http://learnenglish.britishcouncil.org/>, Online Dictionaries, Cambridge dictionary online, MacMillan dictionary, Oxford learner's dictionaries

**References:**

1. [www.pointblank7.in](http://www.pointblank7.in)> News & Politics> Features dt. 15.05.2019
2. Learning English a Communication Approach by Orient Longman Pvt Ltd. Hyderabad , 2005.

List of COs	PO no. and keyword	Competency Indicator:	Performance Indicator:
CO1.	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.1	10.1.1 10.1.2

CO2	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1 10.3.2
CO3.	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.2
CO4.	PO9-Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	9.2	9.2.1 9.2.2 9.2.3
CO5.	PO10-Able to comprehend and write effective reports and design documentation.	10.3	10.3.1 10.3.2
CO6.	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1 10.3.2

Course Code	Course Title	L	T	P	Credits
19AES0302	Design Thinking and Product Innovation	2	0	0	2

**Course Outcomes:**

CO1. Generate and develop different design ideas.

CO2. Appreciate the innovation and benefits of design thinking.

CO3. Develop innovative products or services for a customer base using ideation techniques.

CO4. Build prototypes for complex problems using gathered user requirements.

CO5. Improve prototype by testing it with a specific set of users for making it sustainable by following ethics

**UNIT I: ENGINEERING DESIGN**

Introduction to design, characteristics of successful product development, product development process, identification of opportunities, product planning, Innovation in product development.

**UNIT II: DESIGN THINKING PROCESS**

Design thinking: Introduction, Principles, the process, Innovation in design thinking, benefits of Design thinking, design thinking and innovation, case studies

**UNIT III: IDEATION**

Idea generation: Introduction, techniques, Conventional methods, Intuitive methods, Brainstorming, Gallery method, Delphi method, Synectics, etc Select ideas from ideation methods, case studies

**UNIT IV: PROTOTYPING**

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype

**UNIT V: TESTING PROTOTYPES**

Prototyping for digital products: What's unique for digital, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users.

**TEXTBOOKS:**

1. Christoph Meinel and Larry Leifer, "Design Thinking", Springer, 2011
2. Kathryn McElroy, —Prototyping for Designers: Developing the best Digital and Physical Products, O'Reilly, 2017.

**REFERENCES:**

1. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>
2. <https://www.ibm.com/design/thinking/page/toolkit>
3. <https://www.interaction-design.org/literature/article/define-and-frame-your-design-challenge-by-creating-your-point-of-view-and-ask-how-might-we>
4. <https://www.culturepartnership.eu/en/article/ten-tools-for-design-thinking>
5. <https://nptel.ac.in/courses/109/104/109104109/>
6. <https://nptel.ac.in/courses/110106124/>

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	<b>PO 3:</b> Design/Development of Solutions	3.3	3.3.1
CO: 2	<b>PO 2:</b> Problem analysis	2.1	2.1.3
CO: 3	<b>PO 3:</b> Design/Development of Solutions	3.2	3.2.1
CO: 4	<b>PO 3:</b> Design/Development of Solutions	3.1	3.1.1 3.1.5
CO: 5	<b>PO 4:</b> Conduct investigations of complex problems	4.3	4.3.1

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

**Year: II**

**Semester: II**

**Branch of Study: ECE**

Course Code	Course Title	L	T	P	Credits
19APC0208	Control Systems	3	0	0	3

**Course Outcomes:** Students will be able to

**CO1:** Develop the transfer function of Mechanical systems, Electrical systems and Electro mechanical systems.

**CO2:** Develop the transfer function using Block Diagram reduction and Signal flow graph technique of LTI systems.

**CO3:** Obtain the time domain specifications and error constants of a First order and second order systems.

**CO4:** Determine the stability of a linear time invariant systems using Routh criterion, Root locus, Bode plots, polar plots and Nyquist plot.

**CO5:** Derive state space model of a given physical system and solve the state equation.

**Unit-I: Introduction to Control Problem**

System Representation-Classification of systems-Feedback Control-Benefits of Feedback- Open-Loop and Closed-loop systems. Advantages and Dis-advantages of control systems-Industrial Control examples – Transfer functions and limitations. Mathematical models of Physical systems-Transfer function models of linear time-invariant systems- Electrical, Mechanical and Electro-Mechanical Systems-Electrical Analogues-Block diagram and their Reduction techniques-Signal flow graph.

**Unit-II: Time Response and Stability Analysis**

Standard test signals. Time response of first and second order systems for standard test inputs. Application of initial and final value theorem. Design specifications for second-order systems based on the time-response-Steady state error -Static and generalized error constants.

**Unit-III: Stability Analysis**

Concept of stability–Absolute and Relative Stability analysis-Routh-Hurwitz Criteria, Root-Locus technique. Construction of Root-loci, adding poles and zeros to  $G(s)H(s)$  on the root loci.

**Unit-IV: Frequency-response Analysis**

Introduction to Frequency domain specifications -Relationship between time and frequency response, Polar plots, Bode plots. Nyquist stability criterion. Relative stability using Nyquist criterion – Gain and Phase margin. Design P, PI, and PD & PID controllers

**Unit-V: State variable Analysis (8 hours)**

Concepts of state variables- State space model- Diagonalization of State Matrix- Solution of state equations- Eigen values and Stability Analysis-State Transition Matrix (STM) -Concept of controlLaboratoryility and observability.

**Text Books :**

1. M. Gopal, “Control Systems: Principles and Design”, McGraw Hill Education, 1997.
2. B. C. Kuo, “Automatic Control System”, Prentice Hall, 1995.

**Reference Books:**

1. K. Ogata, “Modern Control Engineering”, Prentice Hall, 1991.
2. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International, 2009



CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1:Engineering knowledge	1.1	1.1.1
	PO3:Design/Development of solutions	3.2	3.2.3
CO2	PO1:Engineering knowledge	1.1	1.1.1
	PO3:Design/Development of solutions	3.2	3.2.3
CO3	PO1:Engineering knowledge	1.1	1.1.1
	PO2: Problem analysis	2.1	2.1.2
CO4	PO1:Engineering knowledge	1.1	1.1.1
	PO4:Conductinvestigations of complex problems	4.1	4.1.2
CO5	PO1:Engineering knowledge	1.1	1.1.1
	PO2: Problem analysis	2.1	2.1.2

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

**Year: II**

**Semester:II**

**Branch of Study: ECE**

Course Code	Course Title	L	T	P	Credits
19APC0406	Analog Electronic Circuits	3	0	0	3

**Course Objectives:** Students will be able to

CO1: Understand multi stage amplifiers using BJT and FET.

CO2: Understand high frequency model and analyze its frequency responses. CO3: Understand feedback amplifiers and oscillators along with design.

CO4: Understand power amplifiers.

CO5: Understand tuned amplifiers and their effect on bandwidth and stability.

**Unit I: Multi Stage Amplifiers**

Introduction, Classification of Amplifiers, Analysis of Cascaded amplifiers, Different Coupling Schemes used in Amplifiers, Analysis of two stage RC Coupled Amplifier, high input resistance transistor amplifiers- Darlington Pair Amplifier, Boot Strap Emitter Follower, Cascade Amplifier, Differential Amplifier, Analysis of multi stage amplifiers using FET.

**Unit II: High Frequency Transistor Amplifiers- BJT**

Transistor at High Frequencies, Hybrid-  $\pi$  Common Emitter transistor model, Validity of hybrid  $\pi$  model, determination of high-frequency parameters in terms of low-frequency parameters, Single Stage CE Amplifier frequency response with short circuit load and resistive load, gain cutoff frequencies, Gain-Bandwidth Product, Emitter follower at higher frequencies, Illustrative design problems.

**FET:**FET at High Frequencies, High Frequencies FET Model, Analysis of Common Source and Common Drain Amplifier circuits at High frequencies.

**Unit III: Feedback Amplifiers and Oscillators**

Concepts of Feedback, Classification of Feedback Amplifiers, General Characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier characteristics: Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative design Problems.

Introduction, Classification of Oscillators, Conditions for Oscillations, RC and LC Oscillators, RC-Phase shift and Wien-Bridge Oscillators, Generalized Analysis of LC Oscillators, Hartley and Colpitts Oscillators, Crystal Oscillators, Frequency and Amplitude Stability of Oscillators, Illustrative design problems.

**Unit IV: Power Amplifiers**

Introduction, Classification of power amplifiers, Class A large signal Amplifiers-Series fed and Transformer coupled amplifier, Efficiency, Class B Amplifier -Push-pull amplifiers, Efficiency of Class B Amplifier, Complementary Symmetry push pull amplifier, Cross over Distortion, Phase Inverters, Class AB operation, Class D amplifier, Class S amplifier, MOSFET power amplifier, Thermal stability and Heat sink, Second harmonic Distortions, Higher order harmonic Distortion.

**Unit V: Tuned Amplifiers**

Introduction, series resonance, Transformation of resistor and inductor, Parallel Resonance, Q-Factor, Impedance variation near resonance, Classification of tuned amplifiers, Small Signal Tuned Amplifier – Capacitance and transformed coupled single tuned amplifier, Double Tuned Amplifiers, Effect of Cascading Single tuned amplifiers on Band width, Effect of Cascading Double tuned amplifiers on Band width, Staggered tuned amplifiers, Stability of tuned amplifiers

**Text Books:**

1. J. Millman and C.C. Halkias, “Integrated Electronics”, McGraw-Hill, 1972.
2. Donald A. Neaman, “Electronic Circuit Analysis and Design”, McGraw Hill.
3. Salivahanan, N.Suresh Kumar, A. Vallavaraj, “Electronic Devices and Circuits”, Tata McGraw Hill, Second Edition.

**References:**

1. Robert T. Paynter, “Introductory Electronic Devices and Circuits”, Pearson Education, 7th Edition
2. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits Theory”

Pearson/Prentice Hall, 9th Edition, 2006.

3. Sedra A.S. and K.C. Smith, "Micro Electronic Circuits", Oxford University Press, 5th Edition.

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: II**

**Branch of Study: ECE,EEE &CSE**

Course Code	Course Title	L	T	P	Credits
19AES0101	Basics of Civil and Mechanical Engineering	3	0	0	3

Course Outcomes:

CO 1: understand principles of Stress and Strain and able to draw SFD & BMD for simply supported beams and cantilever beams.

CO 2: understand basic principles of Strain Measurement and apply the concepts of Strain Rosettes for strain measurement.

CO 3: understand common building materials used in construction and analyze characteristics of common building materials.

CO 4: Apply velocity ratio concepts in power transmission. CO 5: Understand the principles of CAD, CAM & CIM. (L.2)

**PART – A**

**UNIT – I:**

Basic Definitions of Force – Stress – Strain – Elasticity. Shear force – Bending Moment – Torsion . Simple problems on Shear force Diagram and Bending moment Diagram for cantilever and simply supported beams.

**UNIT – II:**

Measurement of Strain - Electrical Capacitance and Resistance Strain gauges – multi channel strain indicators. Rosette analysis – Rectangular and Triangular strain rosettes – Wheatstone bridge.

**UNIT – III:**

Characteristics of common building materials – Brick – Types – Testing; Timber – Classification – Seasoning – Defects in Timber ; Glass – Classification – uses; steel and its applications in construction industry.

**PART – B**

**UNIT – IV: Power Plants**

Introduction, Classification of power plants – working principle of steam, gas, diesel, hydro- electric and nuclear power plants – merits and demerits – pumps, and turbines – working principle of reciprocating pumps (single acting and double acting) – centrifugal pump.

**UNIT – V: IC Engines**

Internal Combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines.

**UNIT – VI: Computer Aided Design & Manufacturing**

Terminology of Refrigeration and air Conditioning. Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – window and split type room air conditioner.

Text Books:

1. Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., NewDelhi.
2. Ramamrutham S., “Basic Civil Engineering”, Dhanpat Rai Publishing Co. (P)Ltd. References:
  1. S.Trymbaka Murthy., “Computer Aided Engineering Drawing” , UniversitiesPress
  2. Seetharaman S., “Basic Civil Engineering”, AnuradhaAgencies.
  3. Venugopal K. and Prahu Raja V., “Basic Mechanical Engineering”, AnuradhaPublishers, Kumbakonam.
4. Er. R. Vaishnavi, Basic Civil and Mechanical Engineering, 2/e, S. ChandPublications.

List of COs	PO no. and keyword	Competency	Performance Indicator
CO1	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
		1.4	1.4.1
	PO2: Problem analysis	2.2	2.2.1
		2.3	2.3.1
CO2	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
		1.4	1.4.1
	PO2: Problem analysis	2.2	2.2
		2.3	2.3.1
CO3	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
		1.4	1.4.1
	PO2: Problem analysis	2.2	2.2.1
		2.3	2.3.1
CO 4	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
CO 5	PO1: Engineering knowledge	1.2	1.2.1
	PO2: Problem analysis	1.3	1.3.1
		1.4	1.4.1

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

**II.B.Tech Semester: II Branch: Common to ALL**

<b>Subject Code</b>	<b>Subject Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>19AMC9901</b>	<b>Biology For Engineers</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Course Outcomes:**

1. Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
2. Explain about biomolecules, their structure, function and their role in the living organisms. How biomolecules are useful in Industry.
3. Brief about human physiology.
4. Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
5. Know about application of biological principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.

**Unit I: Introduction to Basic Biology**

**(10 hrs)**

Evolution: Different patterns of evolution, Darwin's theory of evolution, Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification, Tissue Engineering.

**Unit II: Introduction to Biomolecules**

**(10hrs)**

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

**Unit III: Human Physiology**

**(08hrs)**

Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle, Central Nerves System and Excretory system.

**Unit IV: Introduction to Molecular Biology and recombinant DNA Technology**

**(08hrs)**

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. DNA technology. Introduction to gene cloning.

**Unit V: Application of Biology**

**(10 hrs)**

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, Properties and Classification of virus, Immune response to virus, Definitions-Pandemic, Epidemic and outbreak, pandemic alert system ranges, Prevention of pandemic disease and pandemic preparation.

**Text books:**

1. P.K.Gupta, Cell and Molecular Biology, 5<sup>th</sup> Edition, Rastogi Publications
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

**Reference Books:**

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014.
6. Richard Dawkins, River Out of Eden: A Darwinian View of Life

<b>List of COs</b>	<b>PO no. and keyword</b>	<b>Competency Indicator</b>	<b>Performance Indicator</b>
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

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES: TIRUPATI  
(AUTONOMOUS)**

**AK 19 Regulations**

**B. Tech II- Year**

**Semester : II**

**Branch: Common to all**

Subject Code 19AHS9904	Subject Name <b>Communicative English II Laboratory</b>	L 0	T 0	P 2	Credit: 1
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**Course Outcomes**

1. Prioritize information from reading texts after selecting relevant and useful points.
2. Make formal structured presentations on academic topics using PPT slides with relevant graphical elements.
3. Participate in Group discussions using appropriate conventions and language strategies.
4. Paraphrase short academic text using suitable strategies and conventions.
5. Collaborate with a partner to make presentations and Project

**Syllabus**

**Unit 1**

**Oral Presentation:** Reading for presenting – strategies to select, compile and synthesize information for presentation; reading to recognize academic style. Listening for presentation strategies and answering questions- Formal presentations using PPT slides without graphic elements

**Unit 2**

Power point Presentation/Poster Presentation: Understand formal and informal styles; recognize the difference between facts and opinions. Following an argument/ logical flow of thought; answering questions, formal presentations using PPT slides with graphic elements.

**Unit 3**

Group discussion on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position. Identifying claims, evidences, views, opinions and stance/ position. Identifying views and opinions expressed by different speakers while listening to discussions.

**Unit 4**

Reading for inferential comprehension. Group discussion; reaching consensus in group work(academic context).

Understanding inferences; processing of information using specific context clues from the text. **Unit 5**

Formal team presentations on academic/ general topics using PPT slides-identifying sections in project reports; understanding the purpose of each section; significance of references.

**References:**

1. Effective Technical Communication, Rizvi, Tata McGraw-Hill Education 2007
2. A Practical Course in Effective English Speaking skills, J.K.Gangal, PHI Learning Pvt Ltd, 2012
3. A Course in Communication Skills, P.Kiranmai Dutt, Geetha Rajeevan, C.L.N.Prakash, 2008.
4. Technical Communication, Meenakshi Raman, Oxford University Press
5. Professional Communication Skills, Er.A.K.Jain, Pravin S.R.Bhatia, Dr.A.M.Sheikh, S.Chand & Company Ltd, 2001.



List of COs	PO No. and keyword	Competency Indicator:	Performance Indicator
CO1.	PO10 Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.1	10.1.1 10.1.2
CO2.	PO10 Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1 10.3.2
CO3.	PO9 Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	9.2	9.2.1 9.2.2 9.2.3
CO4.	PO10 Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions	10.3	10.3.1 10.3.2
CO5.	PO10 Able to comprehend and write effective reports and design documentation.	10.3	10.3.1 10.3.2

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

**Year:II**

**Semester:II**

**Branch of Study : Common toall**

<b>Course Code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
19AES0303	Design Thinking and Product Innovation Laboratory	0	0	2	1

**Course Outcomes:**

CO 1: Design and Fabricate using PCB

CO 2: Design Analog and Digital Circuits using PCBs and ICs.

CO 3: Design measuring devices for temperature, pressure, humidity, water level, smart lighting.

CO4: Design and simulate various filters for Image processing using MATLABABORATORY

CO 5: Design and Implement Interfacing of Various devices to 8086/8051

**List of Experiments (Minimum of 10 experiments)**

1. PCB Design and Fabrication
2. Design an Analog circuit using PCB
3. Design a Digital circuit using ICs
4. Design a device for measurement of Temperature/ pressure.
5. Design a device for measurement of Humidity.
6. Design a device for Water Level Indicator.
7. Design a Smart Lighting system.
8. Design and simulate a filter for removing noise in image using Mat Laboratory
9. Design and simulate a filter for Enhance contrast in image using Mat Laboratory
10. Design and Implement Interfacing of 8279 Keyboard / Display Controller with 8086/8051
11. Design and Implement Interfacing of 8255 PPI with 8086/8051
12. Design and Implement Interfacing of 8259 Interrupt Controller with 8086/8051

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	<b>PO 1:</b> Engineering knowledge	1.3	1.3.1
CO: 2	<b>PO 2:</b> Problem analysis	2.1	2.1.2
CO: 3	<b>PO 5:</b> Modern tool usage	5.3	5.3.2
CO: 4	<b>PO 4:</b> Conduct investigations of complex problems	4.1	4.1.2 4.1.3
CO: 5	<b>PO 3:</b> Design/Development of Solutions	3.4	3.4.2

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

**Year:II**

**Semester: II**

**Branch of Study: ECE**

Course Code	Course Name	L	T	P	Credits
19APC0407	Analog Electronic Circuits Laboratory	0	0	3	1.5

**Course Outcomes:** Students will be able to

CO1: Design multi stage amplifiers using BJT and FET.

CO2: Design high frequency model and analyze its frequency responses. CO3: Design feedback amplifiers and oscillators along with design.

CO4: Understand different power amplifiers and find their conversion efficiency CO5: Designtuned amplifiers and their effect on bandwidth and stability

**List of Experiments:**

**PART A: List of Experiments :( Minimum of Ten Experiments has to be performed)**

1. Determination of  $f_T$  of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt's Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Bootstrapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

**PART B: Equipment required for Laboratory Software:**

- i. Multisim/ Pspice/Equivalent Licensed simulation software tool
- ii. Computer Systems with required specifications

**Hardware:**

13. Regulated Power supplies
14. Analog/Digital Storage Oscilloscopes
15. Analog/Digital Function Generators
16. Digital Multimeters
17. Decade Résistance Boxes/Rheostats
18. Decade Capacitance Boxes
19. Ammeters (Analog or Digital)
20. Voltmeters (Analog or Digital)
21. Active & Passive Electronic Components
22. Bread Boards

23. Connecting Wires

24. CRO Probes etc.

**Note:**The students are required to design the electronic circuit and they have to perform the analysis through simulator using Multisim/Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware Laboratory.

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)  
AK19Regulations**

**Year:II**

**Semester: II**

**Branch of Study :ECE,EEE&CSE**

Course Code	Course Title	L	T	P	Credits
19AES0102	Basic Civil and Mechanical Engineering Laboratory	0	0	3	1.5

**Course Outcomes:** Students will be able to

CO1: Impart basic principles of bending test on Cantilever beam and simply supported beam CO2: Understand principles of strain measurement using electrical strain gauges

CO3: Impart concepts of Torsion, compression and water absorption CO4: Apply velocity ratio concepts in power transmission

CO5: Understand the principles of CAD, CAM & CIM

**PART - A**

**Laboratory Experiments:**

1. Bending test on (Steel/Wood) Cantileverbeam.
2. Bending test on (Steel/Wood) simply supportedbeam.
3. Use of electrical resistance strain gauges.
4. Compression test on Bricks
5. Water absorption test on Bricks
6. Torsion test.
7. Tests on closed coiled and open coiled helical springs

**PART – B**

**The following contents are to be done by any 2D software package**

1. Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling,
2. Mirroring, layers, templates, polyline, trimming, extending, stretching, fillets, arrays, dimensions.
3. Dimensioning principles and conventional representations.
4. Any three simple 2D diagram by using software package.

CO No.	PO No. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
		1.4	1.4.1
	PO2: Problem analysis	2.2	2.2.1
		2.3	2.3.1
CO2	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
		1.4	1.4.1
	PO2: Problem analysis	2.2	2.2.1
		2.3	2.3.1
CO3	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
		1.4	1.4.1
CO 4	PO1: Engineering knowledge	1.2	1.2.1
		1.3	1.3.1
CO 5	PO1: Engineering knowledge	1.2	1.2.1
	PO2: Problem analysis	1.3	1.3.1
		1.4	1.4.1