



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

**Course structure for Four Year Regular B.Tech. Degree Program
AK-20 (Effective for the batches admitted from 2020-21)
ELECTRICAL & ELECTRONICS ENGINEERING (EEE)**

| INDUCTION PROGRAM (3 weeks duration) | |
|---|---|
| ❖ | Physical activity |
| ❖ | Creative Arts |
| ❖ | Universal Human Values |
| ❖ | Literary |
| ❖ | Proficiency Modules |
| ❖ | Lectures by Eminent People |
| ❖ | Visits to local Areas |
| ❖ | Familiarization to Dept./Branch & Innovations |

Semester I (First year)

| Sl. No. | Category | Course Code | Course Title | Hours per week | | | Credits | Scheme of Examination (Max. Marks) | | |
|----------------------|-----------------------------------|-------------|-------------------------------------|----------------|---|---|-------------|------------------------------------|------------|------------|
| | | | | L | T | P | | C | CIE | SEE |
| 1 | Basic Science course | 20ABS9901 | Algebra and Calculus | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Basic Science course | 20ABS9902 | Applied Physics | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Humanities and Social science | 20AHS9901 | Communicative English | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Engineering Science Courses | 20AES0304 | Engineering Workshop Practice | 1 | 0 | 4 | 3 | 30 | 70 | 100 |
| 5 | Engineering Science Courses | 20AES0501 | Problem Solving and Programming | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | Humanities and Social science LAB | 20AHS9902 | Communicative English Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | Basic Science course (LAB) | 20ABS9907 | Applied Physics Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Engineering Science Courses (LAB) | 20AES0503 | Problem Solving and Programming Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| Total credits | | | | | | | 19.5 | 240 | 560 | 800 |

Semester II (First year)

| Sl.No | Category | Course Code | Course Title | Hours per week | | | Credits | Scheme of Examination (Max. Marks) | | |
|----------------------|------------------------------------|-------------|--|----------------|---|---|-------------|------------------------------------|------------|------------|
| | | | | L | T | P | | C | CIE | SEE |
| 1 | Basic Science courses | 20ABS9906 | Differential Equations and Vector Calculus | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Basic Science courses | 20ABS9904 | Chemistry | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Engineering Science Courses | 20AES0101 | Basics of Civil and Mechanical Engineering | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Engineering Science Courses | 20AES0505 | Internet of Things (IoT) | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | Engineering Science Courses | 20AES0301 | Engineering Graphics | 1 | 0 | 4 | 3 | 30 | 70 | 100 |
| 6 | Engineering Science Courses (LAB) | 20AES0102 | Basics of Civil and Mechanical Engineering Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | Basic Science course (LAB) | 20ABS9909 | Chemistry Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Engineering Science Courses (LAB) | 20AES0506 | Internet of Things (IoT) Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 9 | Mandatory course (AICTE suggested) | 20AMC9902 | Constitution of India | 2 | 0 | 0 | 0 | 30 | - | 30 |
| Total credits | | | | | | | 19.5 | 270 | 560 | 830 |

Semester III (Second year)

| Sl. No. | Category | Course Code | Course Title | Hours per week | | | Credits | Scheme of Examination (Max. Marks) | | |
|----------------------|------------------------------------|-------------|--|----------------|---|---|-------------|------------------------------------|------------|------------|
| | | | | L | T | P | | CIE | SEE | Total |
| 1 | Basic Science courses | 20ABS9912 | Transform Techniques and Complex Variables | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Professional Core Course | 20APC0201 | Electrical Circuits - I | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Professional Core courses | 20APC0401 | Electronic devices and circuits | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Professional Core courses | 20APC0202 | Power Systems - I | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | Professional Core courses | 20APC0203 | Electrical Machines-I | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | Professional Core courses (LAB) | 20APC0204 | Electrical Circuits-I Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | Professional Core courses (LAB) | 20APC0404 | Electronic Devices and Circuits Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Professional Core courses (LAB) | 20APC0205 | Electrical Machines-I Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 9 | Skill oriented course | 20AHE9902 | Principles of Effective Public Speaking | 2 | 0 | 0 | 2 | 100 | - | 100 |
| 10 | Mandatory course (AICTE suggested) | 20AMC9903 | Environmental Studies | 3 | 0 | 0 | 0 | 30 | - | 30 |
| Total credits | | | | | | | 21.5 | 370 | 560 | 930 |

Semester IV (Second year)

| Sl. No | Category | Code | Course Title | Hours | | | Credits | Scheme of Examination (Max. Marks) | | |
|---|---|-----------|---|----------|----------|----------|-------------|------------------------------------|------------|-------------|
| | | | | L | T | P | | CIE | SEE | Total |
| 1 | Engineering Science Courses | 20AES0509 | Basics of Python Programming | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Basic Science Course /Prof core course | 20APC0206 | Electrical Circuits-II | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Professional Core courses | 20APC0207 | Electrical Machines-II | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Professional Core courses | 20APC0208 | Engineering Electromagnetics | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | Humanities and Social Sciences | 20AHSMB01 | Managerial Economics and financial analysis | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | Humanities and Social Sciences | 20AHS9905 | Universal Human Values | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 7 | Engineering Science Courses/Prof Core (Interdisciplinary) (LAB) | 20AES0510 | Basics of Python Programming Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Professional Core courses (LAB) | 20APC0209 | Electrical circuits-II Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 9 | Professional Core courses (LAB) | 20APC0210 | Electrical Machines-II Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 10 | Skill oriented course | 20ASC0201 | Simulation of circuits using PSPICE | 1 | 0 | 2 | 2 | 100 | - | 100 |
| Total credits | | | | | | | 24.5 | 370 | 630 | 1000 |
| Community service project | | | | | | | | | | |
| Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) | | | | 4 | 0 | 0 | 4 | 100 | | 100 |

Semester V (Third year)

| S. No | Category | Code | Course Title | Hours | | | Credits | Scheme of Examination (Max. Marks) | | |
|---|---|-----------|---|----------|----------|----------|-------------|------------------------------------|------------|------------|
| | | | | L | T | P | | CIE | SEE | Total |
| 1 | Professional Core courses | 20APC0211 | Electrical Machines-III | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Professional Core courses | 20APC0212 | Power Electronics | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Professional Core courses | 20APC0213 | Control Systems | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Open Elective Course /Job oriented elective | 20APC0425 | Analog and Digital IC Applications | 3 | 1 | 0 | 3 | 30 | 70 | 100 |
| 5 | Professional Elective courses | 20APE0201 | Power Systems-II | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | Professional Core courses Lab | 20APC0214 | Control Systems Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | Professional Core courses Lab | 20APC0215 | Power Electronics Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Skill advanced course/ soft skill course | 20ASC0202 | Introduction to Programming with MATLAB | 1 | 0 | 2 | 2 | 100 | - | 100 |
| 9 | Mandatory course (AICTE suggested) | 20AMC9901 | Biology for Engineers | 3 | 0 | 0 | 0 | 30 | - | 30 |
| Evaluation of Community service project | | | | 0 | 0 | 0 | 1.5 | 100 | - | 100 |
| Total credits | | | | | | | 21.5 | 440 | 490 | 930 |
| Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) | | | | 4 | 0 | 0 | 4 | 100 | | 100 |

Semester VI (Third year)

| S. No | Category | Code | Course Title | Hours | | | Credits | Scheme of Examination (Max. Marks) | | |
|---|---|-----------|---|----------|----------|----------|-------------|------------------------------------|------------|------------|
| | | | | L | T | P | | CIE | SEE | Total |
| 1 | Professional Core courses | 20APC0216 | Electrical Measurements and Instrumentation | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Professional Core courses | 20APC0217 | Power System Analysis | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Professional Core courses | 20APC0218 | Switch Gear and Protection | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 4 | Professional Elective courses | 20APC0418 | Microprocessors and Microcontrollers | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | Open Elective Course/Job oriented elective (MOOCS-NPTEL COURSES) | 20AOE0515 | The joy of computing using Python | - | - | - | 3 | - | - | 100 |
| | | 20AOEMB01 | Principles of Management | | | | | | | |
| | | 20AOEMB02 | Entrepreneurship | | | | | | | |
| 6 | Professional Core courses Lab | 20APC0219 | Electrical Measurements Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 7 | Professional Core courses Lab | 20APC0220 | Power System Analysis Lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 8 | Professional Core courses Lab | 20APC0221 | Power systems protection lab | 0 | 0 | 3 | 1.5 | 30 | 70 | 100 |
| 9 | Skill advanced course/ soft skill course | 20ASC0203 | Numerical techniques using MATLAB | 1 | 0 | 2 | 2 | 100 | - | 100 |
| 10 | Mandatory course (AICTE) | 20AMC9904 | Professional Ethics and Human values | 3 | 0 | 0 | 0 | 30 | - | 30 |
| Total credits | | | | | | | 21.5 | 340 | 490 | 930 |
| Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) | | | | 4 | 0 | 0 | 4 | 100 | | 100 |
| Industrial/Research Internship (Mandatory) 2 Months during summer vacation | | | | | | | | | | |

Semester VII (Fourth year)

| S. No | Category | Code | Course Title | Hours | | | Credits | Scheme of Examination (Max. Marks) | | |
|---|--|-----------|---|----------|---|----------|-----------|------------------------------------|------------|------------|
| | | | | L | T | P | | CIE | SEE | Total |
| 1 | Professional Elective courses | 20APE0203 | Flexible AC Transmission Systems | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 2 | Professional Elective courses | 20APE0204 | Neural networks and fuzzy logic | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 3 | Professional Elective courses (MOOCS-NPTEL COURSES) | 20APE0205 | Design of photovoltaic systems | - | - | - | 3 | - | - | 100 |
| | | 20APE0206 | Solar Energy Engineering and Technology | | | | | | | |
| | | 20APE0207 | Physics of Renewable Energy Systems | | | | | | | |
| 4 | Open Elective Courses/ Job oriented elective | 20APC0427 | Embedded systems | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 5 | Open Elective Courses/ Job oriented elective | 20APE0306 | Renewable energy technologies | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 6 | Humanities and Social Science Elective | 20AHE9903 | Professional Communication | 3 | 0 | 0 | 3 | 30 | 70 | 100 |
| 7 | Skill advanced course/ soft skill course | 20ASC0204 | Electrical CAD | 1 | 0 | 2 | 2 | 100 | | 100 |
| Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester) | | | | 0 | 0 | 0 | 3 | 100 | | 100 |
| Total credits | | | | | | | 23 | 350 | 350 | 800 |
| Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also) | | | | 4 | | 0 | 4 | 100 | | 100 |

Semester VIII (Fourth year)

| Sl. No | Category | Code | Course Title | Hours per week | | | Credits | Scheme of Examination (Max. Marks) | | |
|------------------------------|---------------|-----------|--|----------------|---|---|------------|------------------------------------|-------------|-------------|
| | | | | L | T | P | | CIE | SEE | Total |
| 1 | Major Project | 20APRO201 | Project work, seminar and internship in industry | 0 | 0 | 0 | 12 | 60 | 140 | 200 |
| INTERNSHIP (6 MONTHS) | | | | | | | | | | |
| Total credits | | | | | | | 12 | 60 | 140 | 200 |
| Grand Total | | | | | | | 163 | 2440 | 3780 | 6420 |

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

References:

1. Dr.T.K.V Iyengar, B.Krishna Gandhi, S. Ranganathamamd M.V.S.S.N Prasad, Mathematics – 1, S.Chand publications.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. B.V.Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
4. N.Bali, M.Goyal, C.Watkins, Advanced Engineering Mathematics, Infinity Science Press.

| List of COs | PO no. and keyword | Competency Indicator | Performance Indicator |
|--------------------|---|-----------------------------|------------------------------|
| CO1 | PO1:Apply the knowledge of mathematics | 1.1 | 1.1.1 |
| CO2 | PO1:Apply the knowledge of mathematics | 1.1 | 1.1.1 |
| CO3 | PO1: Apply the knowledge of mathematics | 1.1 | 1.1.1 |
| CO4 | Po2 :analyse complex engineering problems | 2.1 | 2.1.3 |
| CO5 | Po2 :analyse complex engineering problems | 2.1 | 2.1.3 |

**AMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI
(AUTONOMOUS)
AK 20 Regulations**

B.Tech- I Year

Semester: I

Branch: EEE, ECE

| Course Code | Course Title | L | T | P | Credits |
|------------------|------------------------|----------|----------|----------|----------|
| 20ABS9902 | Applied Physics | 3 | 0 | 0 | 3 |

Course Outcomes

1. Analyze the wave properties of light and the interaction of energy with the matter.
2. Apply electromagnetic wave propagation in different guided media.
3. Assess the electromagnetic wave propagation and its power in different media
4. Analyze the conductivity of semiconductors.
5. Interpret the difference between normal conductor and superconductor and apply the nanomaterials for engineering applications.

Unit I : Optics and EM Theory

10 Hrs

Interference of light -principle of superposition-Conditions for sustained Interference-Interference in thin films (reflected light) - Newton's Rings -Determination of Wavelength. Diffraction-Fraunhofer diffraction- Single slit and double slit- Diffraction Grating. Divergence and Curl of Electric and Magnetic Fields - Gauss' theorem for divergence and Stokes' theorem for curl - Maxwell's Equations (Quantitative) – Electromagnetic wave - propagation in non-conducting medium - Poynting's Theorem.

Unit II : Lasers and Fiber Optics

10 Hrs

Lasers – Introduction – Characteristics – Spontaneous and Stimulated Emission – Einstein Coefficients – Population Inversion – Excitation Mechanism and Optical Resonator - He-Ne Laser -Nd:YAG Laser – Semiconductor Diode Laser – Applications of Lasers and Holography. Introduction to Optical Fibers – Total Internal Reflection – Critical angle of propagation –Acceptance angle – Numerical Aperture – Classification of fibers based on Refractive index profile – Propagation of electromagnetic wave through optical fiber – modes – importance of V-number-Attenuation, Block Diagram of Fiber optic Communication – Industrial Applications –Fiber optic Sensors.

Unit III : Dielectric and Magnetic Materials

8 Hrs

Introduction—Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations : Electronic and Ionic,(Quantitative), Orientation Polarizations (Qualitative) - Frequency dependence of polarization-Lorentz (internal) field-Claussius-Mosottiequation-Applications of Dielectrics: Ferroelectricity. Introduction-Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability-Origin of permanent magnetic moment – Classification of Magnetic materials - Weiss theory of ferromagnetism (qualitative) – Hysteresis– soft and hard magnetic materials – Magnetic memory device applications .

Unit IV: Semiconductors

8 Hrs

Origin of Energy bands (Qualitative)-Intrinsic and Extrinsic semiconductors –Direct and indirect band gap semiconductors- Density of charge carriers – Fermi energy--Dependence of Fermi energy on carrier concentration and temperature – Electrical conductivity – Drift and Diffusion currents – Continuity equation - Hall effect -Applications of Hall effect and Semiconductors.

Unit V: Superconductors and Nanomaterials

Superconductors-Properties-Meissner's effect-BCS Theory (Qualitative) - Josephson effect (AC&DC)- Types of Superconductors-Applications of superconductors.

Nanomaterials–Significance of nanoscale–: Physical, Mechanical, Magnetic, Optical properties of nanomaterials –Synthesis of nanomaterials:Top-down-Ball Milling, Bottom-up-Chemical vapour deposition–Characterization of nanomaterials : X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM)-Applications of Nanomaterials.

Textbooks:

1. M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy "A Text book of Engineering Physics" - S. Chand Publications, 11th Edition 2019.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.

References:

1. K Thyagarajan "Engineering Physics", -Mc Graw Hill Publishing Company Ltd, 2016
2. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson Education, 2018
3. David J. Griffiths, "Introduction to Electrodynamics" -4/e, Pearson Education, 2014
4. T Pradeep, "A Text book of NanoScience and NanoTechnology" -Tata Mc Graw Hill 2013.

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

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI
(AUTONOMOUS)
AK 20 Regulations**

B.Tech–I Year

Semester: I

Branch : Common to all

| Course Code | Course Title | L | T | P | Credits |
|-------------|-----------------------|---|---|---|---------|
| 20AHS9901 | Communicative English | 3 | 0 | 0 | 3 |

Course Outcomes:

1. Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2. Formulate sentences using proper grammatical structures and correct word forms
3. Speak clearly on a specific topic using suitable discourse markers in informal discussions
4. Write summaries based on global comprehension of reading/listening texts
5. Produce a coherent paragraph interpreting a figure/graph/chart/table
6. Take notes while listening to a talk/lecture to answer questions

Unit 1 : EXPLORATION

10 Hours (4L+6P)

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: A Proposal to Girdle the Earth, Nellie Bly - Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Unit 2: ON CAMPUS

10 Hours (4L+6P)

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks.

Reading: The District School As It Was by One who Went to it, Warren Burton - Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices -linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Unit 3: THE FUTURE OF WORK

10 Hours (4L+6P)

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed **Reading: The Future of Work** - Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Grammar and Vocabulary: Verbs -tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Unit 4: FABRIC OF CHANGE

8 Hours (2L+6P)

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: H.G.Wells and the Uncertainties of Progress, Peter J.Bowler - Studying the use of graphic elements in texts to convey information, reveal trends / patterns / relationships, communicate processes or display complicated data.

Writing: Information transfer; describe, compare, contrast, identify significance / trends based on information provided in figures/charts/graphs/tables.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms.

Unit 5: TOOLS FOR LIFE

8 Hours (2L+6P)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Leaves from the Mental Portfolio of a Eurasian, Sui Sin Far - Reading for comprehension.

Writing: Writing structured essays on specific topics using suitable claims and evidences.

Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject- verb agreement)

Suggested books:

Text Books: English all round: Communication Skills for Under graduation Learners Vol. I, Orient BlackSwanPublisers, First Edition 2019.

Reference Books:

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge,2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley,ELT; 2nd Edition, 2018.
2. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
3. 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.englishmedialab.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

| List of Cos | PO no. and keyword | Competency Indicator | Performance Indicator |
|--------------------|---|-----------------------------|------------------------------|
| CO1. | PO6: Apply contextual knowledge to assess societal, health, safety, legal, and cultural issues. | 6.1 | 6.1.1 |
| CO2. | 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 |
| 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 |
| CO4. | 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 |
| CO5 | 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 |
| CO6. | PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | 10.2 | 10.2.1 |

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI
(AUTONOMOUS)
AK 20 Regulations**

B.Tech - I Year

Semester: I

Branch: CE, ECE, EEE, ME

| Course Code | Course Title | L | T | P | Credits |
|-------------|-------------------------------|---|---|---|---------|
| 20AES0304 | Engineering Workshop Practice | 1 | 0 | 4 | 3 |

Course Outcomes:

- CO: 1 Apply wood working skills in real world applications.
- CO: 2 Build different parts with metal sheets in real world applications.
- CO: 3 Apply fitting operations in various applications.
- CO: 4 Apply different types of basic electric circuit connections.
- CO: 5 Demonstrate soldering and brazing.

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

- a) Half – Lap joint
- b) Mortise and Tenon joint
- c) Corner Dovetail joint or Bridle joint

Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

- a) Tapered tray
- b) Conical funnel
- c) Elbow pipe
- d) Brazing

Fitting:

Study the difference types of fits and tolerances, surface finishing materials.

Familiarity with different types of tools used in fitting and do the following fitting exercises

- a) V-fit
- b) Dovetail fit
- c) Semi-circular fit
- d) Bicycle tyre puncture and change of two wheeler tyre

Electrical Wiring:

Study the different types of circuits and connections,

Familiarities with different types of basic electrical circuits and make the following connections

- a) Parallel and series
- b) Two-way switch
- c) Godown lighting
- d) Tube light
- e) Three phase motor
- f) Soldering of wires

| List of COs | PO no. and keyword | Competency Indicator | Performance Indicator |
|-------------|---------------------------------------|----------------------|-----------------------|
| CO: 1 | PO 1: Engineering knowledge | 1.3 | 1.3.1 |
| CO: 2 | PO 3: Design/Development of Solutions | 3.2 | 3.2.1 |
| CO: 3 | PO 1: Engineering knowledge | 1.3 | 1.3.1 |
| CO: 4 | PO 3: Design/Development of Solutions | 3.2 | 3.2.2 |
| CO: 5 | PO 2: Problem analysis | 2.3 | 2.3.2 |

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI
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B.Tech- I Year

Semester: I

Branch of Study: Common to all

| Course Code | Course Title | L | T | P | Credits |
|--------------------|--|----------|----------|----------|----------------|
| 20AES0501 | Problem Solving and Programming | 3 | 0 | 0 | 3 |

Course Outcomes:

1. Construct his own computer using parts.
2. Recognize the importance of programming language independent constructs
3. Solve computational problems
4. Select the features of C language appropriate for solving a problem.
5. Design computer programs for real world problems.
6. Organize the data which is more appropriated for solving a problem.

Unit 1:

Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.

Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Unit 2:

Introduction to computer problem solving: Introduction, the problem-solving aspect, top-down design, implementation of algorithms, the efficiency of algorithms, the analysis of algorithms.

Fundamental algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

Unit3:

Types, Operators, and Expressions: Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.

Input and output: Standard input and output, formatted output-Printf, formatted input-Scanf.

Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Do-while, break and continue, Goto and labels.

Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

Unit 4:

Factoring methods: Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.

Pointers and arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.

Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the kth smallest element

Unit 5:

Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binarysearch.

Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output, Miscellaneous Functions.

Text Books:

1. Pradip Dey, and Manas Ghosh, –Programming in C, 2018, Oxford University Press.
2. R.G. Dromey, —How to Solve it by Computer. 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, –The C Programming Language, 2nd Edition, Pearson.

Reference Books:

1. RS Bichkar —Programming with C, 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, –Information Technology in Theory, 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, –Programming with C, 4th Edition, 2019, McGraw Hill Education.

| List of COs | PO no. and keyword | Competency Indicator | Performance Indicator |
|-------------|----------------------------|----------------------|-----------------------|
| CO1 | PO1: Engineering Knowledge | 1.3 | 1.3.1 |
| CO2 | PO2: Problem analysis | 2.1 | 2.1.1 |
| CO3 | PO2: Problem analysis | 2.2 | 2.2.2 |
| CO4 | PO2: Problem analysis | 2.1 | 2.1.1 |
| CO5 | PO2: Problem analysis | 2.3 | 2.3.1 |
| CO6 | PO2: Problem analysis | 2.2 | 2.2.3 |

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI
(AUTONOMOUS)
AK 20 Regulations**

B. Tech – I Year

Semester: I

Branch: Common to all

| Course Code | Course Title | L | T | P | Credits |
|--------------------|----------------------------------|----------|----------|----------|----------------|
| 20AHS9902 | Communicative English Lab | 0 | 0 | 3 | 1.5 |

Course Outcomes

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
2. Apply communication skills through various language learning activities
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings.
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit 1

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Unit 2

1. JAM
2. Group Discussions
3. Oral Presentations – Power Point Presentations and Poster Presentations

Unit 3

1. Situational dialogues – Greeting and Introduction
2. Formal letter writing and e-mail writing

Unit 4

1. Asking for Information and Giving Directions
2. CV/Resume writing – Cover letter

Unit 5

1. Vocabulary Building
2. Debates

Software Source:

K-Van Solutions Software

Reference:

Teaching English - British Council

| List of COs | PO No. and keyword | Competency Indicator: Description | Performance Indicator: Description |
|-------------|--|-----------------------------------|------------------------------------|
| CO1 | PO10: Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | 10.2 | 10.1.1 |
| 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 |
| CO3 | PO10: Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | 10.2 | 10.2.1 |
| CO4 | PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. | 9.2 | 9.2.1 |
| CO5 | PO10: Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | 10.2 | 10.2.1 |

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI
(AUTONOMOUS)
AK 20 Regulations**

B.Tech- I Year

Semester: I

Branch: EEE, ECE, CSE

| Course Code | Course Title | L | T | P | Credits |
|-------------|---------------------|---|---|---|---------|
| 20ABS9907 | Applied Physics Lab | 0 | 0 | 3 | 1.5 |

Course Outcomes

1. Analyze the wave properties of light and the interaction of energy with the matter.
2. Apply electromagnetic wave propagation in different guided media.
3. Assess the electromagnetic wave propagation and its power in different media
4. Analyze the conductivity of semiconductors.
5. Interpret the difference between normal conductor and superconductor and apply the nanomaterials for engineering applications.

List of Experiments

1. Determination of the thickness of the wire using wedge shape method.
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Dispersive power of a diffraction grating
5. Study of the Magnetic field along the axis of a circular coil carrying current.
6. Study the variation of B versus H of the magnetic material (B-H curve)
7. Determination of the numerical aperture of a given optical fiber and angle of acceptance.
8. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
9. Determination of the energy gap of a semiconductor
10. Determination of crystallite size using X-Ray diffraction spectra.
11. Determination of Wavelength of LASER using diffraction grating.
12. Determination of particle size using LASER.
13. Determination of the resistivity of semiconductor by Four probe method.
14. Determination of dielectric constant by charging and discharging method.
15. Study the temperature dependence of resistance of a thermister.

References:

1. S. Balasubramanian, M.N.Srinivasan, "A Text book of Practical Physics"-S Chand Publishers, 2017.
2. <http://vlab.amrita.edu/index.php-VirtualLabs, Amrita> University.

| List of COs | PO no. and keyword | Competency Indicator | Performance Indicator |
|-------------|---|----------------------|-----------------------|
| CO: 1 | PO 4: Analysis and interpretation of data | 4.3 | 4.3.3 |
| CO: 2 | PO 4: Analysis and interpretation of data | 4.3 | 4.3.1 |
| CO: 3 | PO 4: Analysis and interpretation of data | 4.3 | 4.3.1 |
| CO: 4 | PO 4: Analysis and interpretation of data | 4.3 | 4.3.2 |
| CO: 5 | PO 4: Analysis and interpretation of data | 4.3 | 4.3.2 |

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY &SCIENCES:: TIRUPATI
(AUTONOMOUS)
AK 20 Regulations**

B.Tech- I Year

Semester: I

Branch: Common to all

| Course Code | Course Title | L | T | P | Credits | Course |
|-------------|-------------------------------------|---|---|---|---------|--------|
| 20AES0503 | Problem Solving and Programming Lab | 0 | 0 | 3 | 1.5 | |

outcomes:

1. Construct a Computer given its parts
2. Select the right control structure for solving the problem
3. Analyze different sorting algorithms
4. Design solutions for computational problems
5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

Laboratory Experiments:

1. Assemble and disassemble parts of a Computer
2. Design a C program which reverses the number
3. Design a C program which finds the second maximum number among the given list of numbers.
4. Construct a program which finds the kth smallest number among the given list of numbers.
5. Design an algorithm and implement using C language the following exchanges $a \leftarrow b \leftarrow c \leftarrow d \leftarrow a$
6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.
7. Implement the C program which computes the sum of the first n terms of the series $\text{Sum} = 1 - 3 + 5 - 7 + 9$
8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.
9. Design an algorithm and implement using a C program which finds the sum of the infinite series $1 - x^2/2! + x^4/4! - x^6/6! + \dots$
10. Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.
11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.
12. Develop an algorithm which computes the all the factors between 1 and 100 for a given number and implement it using C.
13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.
14. Design a C program which reverses the elements of the array.
15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The stars for each number should be printed horizontally.
16. Implement the sorting algorithms a. Insertion sort b. Exchange sort c. Selection sort d. Partitioning sort.
17. Illustrate the use of auto, static, register and external variables.
18. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.
19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.
20. Design a C program which sorts the strings using array of pointers.

Instructors may add some experiments to the above list. Moreover, 50% of the experiments are to be changed every academic year. Instructors can choose the experiments, provided those experiments are not repetitions.

References:

1. B.Govindarajulu,—IBMPCandClonesHardwareTroubleshootingandMaintenancel,TataMcGraw-Hill,2ndedition,2002.
2. R.G. Dromey, —How to Solve it by Computer|. 2014,Pearson.

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|--------------------|---------------------------|-----------------------------|------------------------------|
| CO1 | PO2: Problem analysis | 2.1 | 2.1.1 |
| CO2 | PO2: Problem analysis | 2..2 | 2.2.2 |
| CO3 | PO2: Problem analysis | 2.1 | 2.1.1 |
| CO4 | PO2: Problem analysis | 2.3 | 2.3.1 |
| CO5 | PO2: Problem analysis | 2.2 | 2.2.3 |