ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS) AK20-REGULATIONS
ELECTRONICS and COMMUNICATION ENGINEERING (ECE)
(Effective for the batches admitted in 2020-21)

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 and Innovations

I B. Tech – I Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
Theory										
1	BSC	20ABS9901	Algebra and Calculus	3	0	0	3	30	70	100
2	BSC	20ABS9902	Applied Physics	3	0	0	3	30	70	100
3	HSMC	20AHS9901	Communicative English	3	0	0	3	30	70	100
4	*ESC	20AES0304	Engineering Workshop Practice	1	0	4	3	30	70	100
5	ESC	20AES0501	Problem Solving and Programming	3	0	0	3	30	70	100
6	HSMC	20AHS9902	Communicative English Lab	0	0	3	1.5	30	70	100
7	BSCL	20ABS9907	Applied Physics Lab	0	0	3	1.5	30	70	100
8	ESC	20AES0503	Problem Solving and Programming Lab	0	0	3	1.5	30	70	100
			TOTAL				**19.5**	**240**	**560**	**800**

I B. Tech – II Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
Theory										
1	BSC	20ABS9906	Differential Equations and Vector Calculus	3	0	0	3	30	70	100
2	BSC	20ABS9904	Chemistry	3	0	0	3	30	70	100
3	ESC	20AES0201	Network Theory	3	0	0	3	30	70	100
4	ESC	20AES0502	Data Structures	3	0	0	3	30	70	100
5	ESC	20AES0301	Engineering Graphics	1	0	4	3	30	70	100
6	ESC	20AES0203	Network Theory Lab	0	0	3	1.5	30	70	100
7	BSC	20ABS9909	Chemistry Lab	0	0	3	1.5	30	70	100
8	ESC	20AES0504	Data Structures Lab	0	0	3	1.5	30	70	100
9	MC	20AMC9904	Constitution of India`	2	0	0	0	30		30
			TOTAL				**19.5**	**270**	**560**	**830**

II B. Tech – III Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
Theory										
1	BSC	20ABS9912	Transform Techniques and Complex Variables	3	0	0	3	30	70	100
2	PCC	20APC0401	Electronic Devices and Circuits	3	0	0	3	30	70	100
3	PCC	20APC0402	Switching Theory and Logic Design	3	0	0	3	30	70	100
4	PCC	20APC0403	Signals and Systems	3	0	0	3	30	70	100
5	HSS	20AHSMB01	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
6	PCCL	20APC0404	Electronic Devices and Circuits Lab	0	0	3	1.5	30	70	100
7	PCCL	20APC0405	Signals and Systems Lab	0	0	3	1.5	30	70	100
8	PCCL	20APC0406	Switching Theory and Logic Design Lab	0	0	3	1.5	30	70	100
9	SOC	20ASC0401	Electronic Circuit Design	1	0	2	2	100	-	100
10	MC	20AMC9901	Biology for Engineers	2	0	0	0	30		30
TOTAL							**21.5**	**370**	**560**	**930**

II B. Tech – IV Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
Theory										
1	ESC	20AES0509	Basics of Python Programming	3	0	0	3	30	70	100
2	PCC	20APC0407	Probability Theory and Stochastic Process	3	0	0	3	30	70	100
3	PCC	20APC0408	Electromagnetic Theory and Transmission Lines	3	0	0	3	30	70	100
4	PCC	20APC0409	Analog Communication Systems	3	0	0	3	30	70	100
5	PCC	20APC0410	Electronic Circuit Analysis	3	0	0	3	30	70	100
6	ESCL	20AES0510	Basics of Python Programming Lab	0	0	3	1.5	30	70	100
7	PCCL	20APC0411	Analog Communication Systems Lab	0	0	3	1.5	30	70	100
8	PCCL	20APC0412	Electronic Circuit Analysis Lab	0	0	3	1.5	30	70	100
9	SOC	20ASC0402	Internet of Things	1	0	2	2	100	-	100
TOTAL							**21.5**	**340**	**560**	**900**

III B. Tech – V Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
Theory										
1	PCC	20APC0413	Antennas and Wave Propagation	3	0	0	3	30	70	100
2	PCC	20APC0414	Digital Communication Systems	3	0	0	3	30	70	100
3	PCC	20APC0415	Integrated Circuits and Applications	3	0	0	3	30	70	100
4	OEC/JOE	20APC0515	Operating Systems	2	0	2	3	30	70	100
		20AOE0202	Programmable Logic Controllers							
		20APC0208	Control Systems							
5	PEC	20APE0401	VLSI Design	3	0	0	3	30	70	100
		20APE0402	Computer Organization							
		20APE0403	Digital System Design							
6	PCCL	20APC0416	Digital Communication Systems Lab	0	0	3	1.5	30	70	100
7	PCCL	20APC0417	Integrated Circuits and Applications Lab	0	0	3	1.5	30	70	100
8	SAC/SSC	20ASA9901	Principles of effective public speaking	1	0	2	2	100	-	100
9	MC	20AMC9904	Professional Ethics and Human Values	2	0	0	0	30	-	30
Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester				0	0	0	1.5	-	-	-
TOTAL							**21.5**	**340**	**490**	**830**

III B. Tech –VI Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
Theory										
1	PCC	20APC0418	Microprocessors and Microcontrollers	3	0	0	3	30	70	100
2	PCC	20APC0419	Digital Signal Processing	3	0	0	3	30	70	100
3	PCC	20APC0420	Microwave and Optical Communications	3	0	0	3	30	70	100
4	PEC	20APE0404	Low Power VLSI Circuits and Systems	3	0	0	3	30	70	100
		20APE0405	MEMS and Microsystems							
		20APE0406	Industrial Electronics							
5	OEC/JOE	20AOE0202	Electrical Technology	2	0	2	3	30	70	100
		20AOE0516	R Programming							
		20AOE0201	Neural Networks and Fuzzy Logic							
6	PCCL	20APC0421	Microprocessors and Microcontrollers Lab	0	0	3	1.5	30	70	100
7	PCCL	20APC0422	Digital Signal Processing Lab	0	0	3	1.5	30	70	100
8	PCCL	20APC0423	Microwave and Optical Communications Lab	0	0	3	1.5	30	70	100
9	SAC/SSC	20ASA0501	Basics of Cloud computing	1	0	2	2	100	-	100
10	MC	20AMC9903	Environmental Studies	2	0	0	0	30	-	30
TOTAL							**21.5**	**370**	**560**	**930**

IV B. Tech – VII Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
Theory										
1	PC	20AOE0401	Pattern Recognition and Applications	3	0	0	3	30	70	100
2	PEC	20APE0407	Digital Image Processing	3	0	0	3	30	70	100
		20APE0408	Adaptive Signal Processing							
		20APE0409	Television Engineering							
3	PEC	20APE0410	Electronic Measurements and Instrumentation	3	0	0	3	30	70	100
		20APE0411	FPGA Design							
		20APE0412	RF Integrated Circuits							
4	PEC	20APE0413	Radar Systems	3	0	0	3	30	70	100
		20APE0414	Satellite Communications							
		20APE0415	Wireless Communications							
5	OEC/JOE	20APC0510	Computer Networks	2	0	2	3	30	70	100
		20AOE0518	Scripting Languages							
		20AOE0402	Bio Medical Instrumentation							
6	OEC/JOE	20APC0512	Data Base Management Systems	2	0	2	3	30	70	100
		20APE0416	Computer System Architecture							
		20AOE0301	Robotics							
7	SAC/SSC	20ASA0403	Embedded Systems	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	-	-	-
TOTAL							**23**	**280**	**350**	**630**

IV B. Tech – VIII Semester

S. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
Theory										
1	MP	PROJ	Project	0	0	0	12	60	140	200
TOTAL							**12**	60	140	200

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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B.Tech I Year I Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20ABS9901	Algebra and Calculus	3	0	0	3

Course Outcomes:

1.Develop the use of matrix algebra techniques that is needed by engineers for practical applications.

2.Utilize mean value theorems to real life problems.

3. Familiarize with functions of several variables which is useful in optimization.

4. Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2-dimensional coordinate systems

5. Students will become familiar with 3- dimensional coordinate systems and also learn the utilization ofspecial functions

Unit I : Matrix Operations and Solving Systems of Linear Equations 12 hrs

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem,

Unit II : Quadratic Forms and Mean Value Theorems 9 hrs

Diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Rolle‘s Theorem, Lagrange‘s mean value theorem, Cauchy‘s mean value theorem, Taylor‘s and Maclaurin's theorems with remainders (without proof);

Unit III: Multivariable calculus 9 hrs

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Unit IV: Multiple Integrals 10hrs

Double integrals, change of order of integration, double integration in polar coordinates, change of Variables in double integration (Cartesian to polar), areas enclosed by plane curves. Evaluation of triple integrals.

Unit V: Special Functions 10 hrs

Beta and Gamma functions and their properties, relation between beta and gamma functions, Bessel functions, Bessel‘s equation, Recurrence formulae or $J_n(x)$, Generating function- Orthoganality of Bessels functions.

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. Ranganatham amd 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

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B.Tech I Year I Semester

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. Asses 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-Mosotti equation-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‘seffect-BCSTheory(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 Edition2019.
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
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AK 20 Regulations

B.Tech I-Year **Semester** : I **Branch :** Common to all

Subject Code: **20AHS9901**	Subject Name: **Communicative English**	L T P 3 0 0	Credits 3

Course Outcomes:

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

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

Syllabus

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 un countable; 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 Book: English all round: Communication Skills for Under graduation Learners Vol. I, Orient BlackSwan Publisers, 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: Description	Performance Indicator: Description
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	10.1 .	10.1.1

	receive clear instructions.		
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

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B.Tech I Year I Semester

Year: I Semester: I/II Branch of Study: Common to CE, ECE, EEE, ME

Subject Code	Subject Name	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 AND SCIENCES, TIRUPATI
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B.Tech I Year I Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20AES0501	Problem Solving and Programming	3	0	0	3

Course Objectives:

1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non-computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language
6. Illustrate the methodology for solving Computational problems

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.

Unit 3:

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 k^{th} smallest element

Unit 5:

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

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.

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

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 AND SCIENCES, TIRUPATI
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B.Tech I Year I Semester

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.

Syllabus

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

Unit 2
1. JAM
2. Small talks on general topics
3. Debates

Unit 3
1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

Unit4
1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Unit 5
1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

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

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B.Tech I Year I Semester

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. Asses 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

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B.Tech I Year I Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20AES0503	Problem Solving and Programming Lab	0	0	3	1.5

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 ← b ← c ← d ←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 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 $1 – x^2/2! + x^4/4! – x^6/6! + ...$
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 1and100 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 starts 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 linkedlist.
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.

Course outcomes:

1. Construct a Computer given its parts (L6)
2. Select the right control structure for solving the problem (L6)
3. Analyze different sorting algorithms (L4)
4. Design solutions for computational problems (L6)
5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

References:

1. B. Govindarajulu, ―IBM PC and Clones Hardware Trouble shooting and Maintenance‖, Tata McGraw-Hill, 2nd edition, 2002.
2. R.G. Dromey, ―How to Solve it by Computer‖. 2014, Pearson.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
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

B.Tech

I Year II Semester

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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B.Tech I Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20ABS9906	Differential Equations and Vector Calculus	3	0	0	3

Course Outcomes:

1. Apply the mathematical concepts of ordinary differential equations of higher order.
2. Solve the differential equations related to various engineering fields .
3. Identify solution methods for partial differential equations that model physical processes .
4. Interpret the physical meaning of different operators such as gradient, curl and divergence .
5. Estimate the work done against a field, circulation and flux using vector calculus .

UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral (e^{ax}, sinax (or) cosax, X^k, $e^{ax}v$, x v(x)), method of variation of parameters, simultaneous linear equations with constant coefficients.

UNIT II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, Applications to simple pendulum, oscillations of a spring, L-C-R Circuit problems and Mass spring system.

UNIT III: Partial Differential Equations – First order

First order partial differential equations, solutions of first order linear and non-linear PDEs.
Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT IV:Vector differentiation

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities

UNIT V: Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Text Books :

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.

References:

1. Dr.T.K.V.Iyengar, Engineering Mathematics-I,S.Chand publishers
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi publication,2008
4. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1:Apply the knowledge of mathematics	1.1	1.1.1
CO2	PO2:Analyse complex engineering problems	2.1	2.1.3
CO3	PO1:Apply the knowledge of mathematics	1.1	1.1.1
CO4	PO1:Apply the knowledge of mathematics	1.1	1.1.1
CO5	PO2:Analyse complex engineering problems	2.1	2.1.3

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B.Tech I Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20ABS9904	CHEMISTRY	3	0	0	3

Course Outcomes:

1. Understand the behaviour of, and interactions between mater and energy at both the atomic and molecular levels
2. Compare the materials of construction for battery and electrochemical sensors
3. Understand the preparation, properties, and applications of thermoplastics & thermo settings, elastomers & conducting polymers.
4. HPLC and GC methods used for separation of gaseous and liquid mixtures.
5. Understand the disadvantages of using hard water and select suitable treatments domestically and industrially.

Unit 1: Structure and Bonding Models (10 hrs)

Planck's quantum theory, Schrodinger wave equation, significance of Ψ^1 and Ψ^2 , applications to hydrogen, particle in a box and their applications for conjugated molecules, crystal field theory – salient features – energy level diagrams for transition metal ions – splitting of orbital‘s in tetrahedral and octahedral complexes, magnetic properties, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 , N_2 and CO, calculation of bond order.

Unit 2: Electrochemistry and Applications (10 hrs)

Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nern‘st equation, cell potential calculations, numerical problems, concept of pH, pH meter and applications of pH metry (acid-base titrations), potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications, photogalvanic cells with specific examples. Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, alkali metal sulphide batteries, Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Secondary cells – lead acid, nickel-metal hydride and lithium ion batteries- working of the batteries including cell reactions, button cells,

Unit 3: Polymer Chemistry (10 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – Bakelite, urea-formaldehyde, Nylon-66, carbon fibres, Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.

Unit 4: Instrumental Methods and Applications (10 hrs)

Principle and applications of Colorimetry, AAS, AES, UV-Viscible spectrophotometry (Beer-Lambert‘s law, Instrumentation ,Principles and applications of Chromatographic techniques(GC & HPLC), separation of gaseous mixtures and liquid mixtures(GC & HPLC methods).

Unit 5: Water Technology (10 hrs)

Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - scale and sludge, Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World

health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins‘ Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference books:

1. J. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. Ben L. Feringa and Wesley R. Browne, Molecular Switches, 2/e, Wiley-VCH, 2011.
4. Willard Merritt Dean Settle, 7 th Edition Instrumental methods for analysis

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 2	PO 1: Apply the knowledge of basic science	1.4	1.4.1
CO: 3	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 4	PO 4: Analyse complex engineering problems	2.4	2.4.4
CO: 5	PO 1: Apply the knowledge of Basic science	1.2	1.2.1

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B.Tech I Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20AES0201	Network Theory	3	0	0	3

COURSE OUTCOMES:

CO1. Solve network problems using mesh and nodal analysis techniques
CO2. Analyze networks using Thevenin, Norton, Maximum power transfer, Superposition, Miller and Millman theorems
CO3. Compute responses of first order and second order networks using time & frequency domain analysis
CO4. Design resonant circuits for given bandwidth
CO5. Utilize z, y, ABCD and h parameters for analyzing two port circuit behavior

UNIT I: Introduction to Electrical Circuits

Passive components and their V-I relations, Energy sources - Ideal, Non-ideal, Independent and dependent sources, Source transformation Kirchoff_s laws, Star–to-Delta or Delta-to-Star Transformations, Mesh analysis and Nodal analysis problem solving, Super node and Super mesh for DC Excitations

UNIT II: Network Theorems

Superposition theorem, Thevenin & Norton theorems, Maximum power transfer theorem, Reciprocity theorem, Millman theorem, Miller Theorem, Tellegan's Theorem, Compensation theorem - problem solving using dependent sources also, Duality and dual networks.

UNIT III: Transients

First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC (sinusoidal) excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method.

UNIT IV: Resonance and Coupled Circuits

Self inductance, Mutual inductance, dot rule, coefficient of coupling, Analysis of multi-winding coupled circuits, series & parallel connection of coupled inductors.

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case resistance present in both branches, anti resonance at all frequencies.

UNIT V: Two Port Networks & Network Functions

Two Port Networks, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters, hybrid and inverse hybrid parameters, relationship between parameters, interconnection of two port networks.

Concept of complex frequency, driving point and transfer functions for one port and two port network, poles & zeros of network functions, Restriction on Pole and Zero locations of network function

Text Books:

1. W. H. Hayt and J. E. Kemmerly, ―Engineering Circuit Analysis‖, McGraw Hill Education, 2013.
2. M. E. Van Valkenburg, ―Network Analysis‖, Prentice Hall, 2006.

References:

1. D. Roy Choudhury, ―Networks and Systems‖, New Age International Publications, 1998.
2. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.
3. Bhise, Chadda, Kulshreshtha, ―Engineering network analysis and filter design‖ Umesh Publication, 2000.
4. Joseph Edminister and Mahmood Nahvi, ―Electric Circuits‖, Schaum's Outline Series, Fourth Edition, Tata McGraw Hill Publishing Company, New Delhi, 2003.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO-1 –engineering knowledge	1.3	1.3.1
CO2	PO-2-problem analysis	2.2	2.2.2 &2.2.3
CO3	PO-4-conduct investigations of complex problems	4.1	4.1.1
CO4	PO-4- conduct investigations of complex problems	4.3	4.3.1
CO5	PO-1- engineering knowledge	1.4	1.4.1

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B.Tech I Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20AES0502	Data Structures	3	0	0	3

Course Objectives:

1. To teach the representation of solution to the problem using algorithm
2. To explain the approach to algorithm analysis
3. To introduce different data structures for solving the problems
4. To demonstrate modeling of the given problem as a graph
5. To elucidate the existing hashing techniques

Unit 1: Introduction

Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Quick sort, how fast can we sort, Merge sort, Heap sort

Unit – 2: Stack, Queue and Linked lists

Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

Unit 3: Trees

Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, Optimal Binary search Trees, AVL Trees. B-Trees: B- Trees, B + Trees.

Unit – 4 : Graphs and Hashing

The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure

Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

Unit – 5: Files and Advanced sorting

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization. Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

Text Books:

1. Ellis Horowitz and Sartaj Sahni, ―Fundamentals of Data Structures in C‖, 2nd Edition, Galgotia Book Source, Pvt. Ltd., 2004.
2. Alan L. Tharp, ―File Organization and Processing‖, Wiley and Sons, 1988.

Reference Books:

1. D. Samanta, ―Classic Data Structures‖, 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Peter Bras, ―Advanced Data Structures‖, Cambridge University Press, 2016
3. Richard F.Gilberg, Behrouz A.Forouzan, ―Data Structures A Pseudo code Approach with C‖, Second Edition, Cengage Learning 2005.

Course Outcomes:

1. Select Appropriate Data Structure for solving a real world problem
2. Select appropriate file organization technique depending on the processing to be done
3. Construct Indexes for Databases
4. Analyse the Algorithms
5. Develop Algorithm for Sorting large files of data

List of COs	PO no. and keyword	Competency	Performance Indicator
CO1	PO1: Engineering Knowledge	1.4	1.4.1
CO2	PO4: Conduct investigations of complex problems	4.1	4.1.4
CO3	PO1: Engineering Knowledge	1.3	1.3.1
CO4	PO2: Problem analysis	2.1	2.1.2
CO5	PO2: Problem analysis	2.3	2.3.1

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Year: I **Semester: I/II** **Branch of Study: Common to all Branches**

Subject Code	Subject Name	L	T	P	Credits
20AES0301	Engineering Graphics	1	0	4	3

Course Outcomes:

CO: 1 Draw various curves applied in engineering.
CO: 2 Show projections of solids and sections graphically.
CO: 3 Draw the development of surfaces of solids.
CO: 4 Use computers as a drafting tool.
CO: 5 Draw isometric and orthographic.

Unit I: Introduction to Engineering graphics: Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions.

a) Conic sections including the rectangular hyperbola- general method only,
b) Cycloid, epicycloids and hypocycloid
c) Involutes

Unit II: Projection of points, lines: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line.

Unit III: Projections of Planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.
Projections of Solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

Unit IV: Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Unit V: Orthographic Projections: Systems of projections, conventions and application to orthographic projections.
Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids.

Text Books and Reference Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers
3. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill
4. Shah and Rana, Engineering Drawing, 2/e, Pearson Education
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill

Additional Sources
YouTube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

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 5: Problem analysis	5.1	5.1.1

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B.Tech I Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20AES0203	Network Theory Lab	0	0	3	1.5

COURSE OUTCOMES:

CO1.Verify Kirchhoff's laws and network theorems
CO2.Measure time constants of RL & RC circuits
CO3.Analyze behavior of RLC circuit for different cases
CO4. Design resonant circuit for given specifications
CO5.Characterize and model the network in terms of all network parameters

List of Experiments:

Any 10 of the following experiments are to be conducted in Hardware & Simulation (Multisim/Open source software):

1. Verification of Kirchoff's Laws
2. Apply Mesh & Nodal Analysis techniques for solving electrical circuits (problems with dependent sources also)
3. Verification of Superposition & Reciprocity Theorem
4. Verification of Thevenin's and Norton's Theorem
5. Verification of Maximum Power Transfer Theorem
6. Verification of Millman and Miller Theorm
7. Measure and calculate RC time constant for a given RC circuit
8. Measure and calculate RL time constant for a given RL circuit
9. Measure and analyze (settling time, overshoot, undershoot, etc.) step response of for a given series RLC circuit for following cases:

(i) $\zeta = 1$ (critically damped system)
(ii) $\zeta > 1$ (over damped system)
(iii) $\zeta < 1$ (under damped system)

Choose appropriate values of R, L, and C to obtain each of above cases one at a time.

10. Design a series RLC resonance circuit. Plot frequency response and find resonance frequency , Bandwidth , Q – factor.
11. Design a parallel RLC resonance circuit. Plot frequency response and find resonance frequency , Bandwidth , Q – factor.
12. Measure and calculate Z, Y parameters of two-port network.
13. Measure and calculate ABCD & h parameters of two-port network.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO-1 –engineering knowledge	1.3	1.3.1
CO2	PO-2-problem analysis	2.2	2.2.2 &2.2.3
CO3	PO-4-conduct investigations of complex problems	4.1	4.1.1
CO4	PO-4- conduct investigations of complex problems	4.3	4.3.1
CO5	PO-1- engineering knowledge	1.4	1.4.1

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COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20ABS9909	CHEMISTRY LAB	0	0	3	1.5

Course Outcomes:

1. To familiarize the students with the basic concepts of chemistry of materials
2. Prepare advanced polymer materials
3. Measure the strength of an acid present in secondary batteries
4. To familiarize with digital and instrumental methods of analysis

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of iron (II) using Diphenylamine indicator (Dichrometry – Internal indicator method)
3. Determination of pH metric titration of strong acid vs. strong base,
4. Conductometric titration of strong acid vs. strong base
5. Determination of Fe(II) in Mohr's salt by potentiometric method.
6. Determination of percentage of Iron in Cement sample by colorimetry
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of phenol-formaldehyde resin
9. Preparation of TIO_2/ZnO nano particles
10. Estimation of Calcium in port land Cement
11. Adsorption of acetic acid by charcoal
12. Thin layer chromatography

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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B.Tech I Year II Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20AES0504	Data Structures Lab	0	0	3	1.5

Course Objectives:

1. To introduce to the different data structures
2. To elucidate how the data structure selection influences the algorithm complexity
3. To explain the different operations that can be performed on different data structures
4. To introduce to the different search and sorting algorithms.

Laboratory Experiments

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue. While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file
15. Reversing the links (not just displaying) of a linked list.
16. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using ‗Ladies first' principle. You may create new linked lists if necessary.
17. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
18. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table. The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table. User may like to remove row/column. Create table datatype and support different operations on it.

Course Outcomes:

1. Select the data structure appropriate for solving the problem
2. Implement searching and sorting algorithms
3. Design new data types
4. Illustrate the working of stack and queue
5. Organize the data in the form of files

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Engineering Knowledge	1.4	1.4.1
CO2	PO 2: Problem analysis	2.2	2.2.4
CO3	PO1: Engineering Knowledge	1.3	1.3.1
CO4	PO1: Engineering Knowledge	1.4	1.4.1
CO5	PO1: Engineering Knowledge	1.4	1.4.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::TIRUPATI
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AK 20 Regulations

B.Tech- I Year **Semester:II** **Branch: EEE,ECE,CE,ME**

MANDATORY COURSE

Subject Code	Subject Name	L	T	P	Credits: 0
20AMC9902	CONSTITUTION OF INDIA	2	0	0	

Course Outcomes:
Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the Powers and functions of Governor, President, Judiciary.
5. Discuss the functions of local administration bodies.

Syllabus

Unit:1 **4 hrs**
History of Making of the Indian Constitution - History Drafting Committee, (Composition & Working)

Unit:2 **8 hrs**
Philosophy of the Indian Constitution - Preamble Salient Features

Unit:3 **8hrs**
Contours of Constitutional Rights & Duties - Fundamental Rights - Right to Equality - Right to Freedom - Right against Exploitation - Right to Freedom of Religion - Cultural and Educational Rights - Right to Constitutional Remedies - Directive Principles of State Policy - Fundamental Duties.

Unit:4 **8hrs**
Organs of Governance - Parliament – Composition - Qualifications and Disqualifications - Powers and Functions - Executive, President, Governor - Council of Ministers -Judiciary, Appointment and Transfer of Judges, Qualifications - Powers and Functions.

Unit:5 **8hrs**
Local Administration - District's Administration head: Role and Importance - Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation - Pachayati raj: Introduction, PRI: ZillaPachayat - Elected officials and their roles, CEO Zilla Panchayat: Position and role - Block level: Organizational Hierarchy (Different departments) - Village level: Role of Elected and Appointed officials - Importance of grass root democracy.

Suggested books for reading:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO 1	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2.	6.2.1
CO 2	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2.	6.2.1
CO 3	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2.	6.2.1
CO 4	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2.	6.2.1
CO 5	PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the Professional Engineering Practice	6.2	6.1.1

B.Tech

II Year III Semester

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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B. Tech II Year IV Semester

Course Code	Course Title	L	T	P	Credits
20ABS9912	**TRANSFORM TECHNIQUES AND COMPLEX VARIABLES**	3	0	0	3

Course Objectives:

Upon completion of the course students will be able to

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).

Text Books:

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

Reference Books:

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.

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO1	PO2: Analyze 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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI (AUTONOMOUS)

B. Tech II Year III Semester

Course Code	Course Title	L	T	P	Credits
20APC0401	ELECTRONIC DEVICES & CIRCUITS	3	0	0	3

Course Outcomes:

Upon completion of the course 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: 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, Varactor diode, Tunnel diode, SCR, UJT.

UNIT II:
RECTIFIERS & FILTERS

Rectifiers: 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, 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 Transistor JFET 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.

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:

3. David A. Bell, "Electronic Devices and Circuits", 5th Edition, Oxford University Press, 2015.
4. Thomas L. Floyd, "Electronic Devices", 9th Edition, Pearson Education, 2013
5. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices & Circuit Theory", 11th Edition, Pearson Education, 2013.

Reference Books:

6. Donald Neamen, "Electronic Circuits: Analysis and Design", 3rd Edition, McGraw-Hill Education, 2011.
7. Muhammad Rashid, "Microelectronic Circuits: Analysis & Design", 2nd Edition, Cengage Learning, 2010.
8. S. Salivahanan, N. Suresh Kumar, "Electronic Devices and Circuits", 4th Edition, McGraw-Hill Education, 2017.

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
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B. Tech II Year III Semester

Course Code	Course Title	L	T	P	Credits
20APC0402	SWITCHING THEORY AND LOGIC DESIGN	3	0	0	3

Course Outcomes:

Upon completion of the course students will be able to

CO1: To introduce basic postulates of Boolean algebra.

CO2: To introduce basic methods for simplifying Boolean expressions.

CO3: To illustrate the concepts and study the procedures for the analysis and design of combinational circuits.

CO4: To illustrate the concepts and study the procedures for the analysis and design of sequential circuits.

CO5: To introduce the concepts of programmable logic devices.

UNIT I:
NUMBER SYSTEM AND BOOLEAN ALGEBRA

Number System: Digital Systems, Binary Numbers, Number base conversions, complements of numbers, Signed binary numbers, Binary codes.

Boolean Algebra: Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations & Logic gates.

UNIT II:
GATE LEVEL MINIMIZATION:

The map method, four variable & Five variable K-map, POS & SOP Simplification, don't care conditions, NAND & NOR Implementation, Other two-level Implementation, Ex-or Function.

Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III:
COMBINATIONAL LOGIC CIRCUITS

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV:
SEQUENTIAL LOGIC CIRCUITS

Sequential Circuits: Latches, Flips-Flops - RS, JK, Master-Slave JK, D & T flip flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, asynchronous counters.

Asynchronous sequential circuits: Introduction, Analysis Procedure, Design Procedure, Reduction of State flow tables, Race-free State Assignment, Hazards.

UNIT V:
PROGRAMMABLE DEVICES:

Memory organization, classification of semiconductor memories, ROM, PROM, DROM, EPROM, EEPROM, RAM, expansion of memory, CCD, Flash memories, content addressable memory, programmable logic devices, PROM at PLD, programmable logic array (PLA) programmable array logic (PAL), field programmable gate array (FPGA).

Text Books:

6. M.Morris Mano & Michel D. Ciletti,"Digital Design", 5th Edition Pearson.
7. Zvi Kohavi and Nirah K.Jha, "Switching theory and Finite Automata Theory", 3rd Edition Cambridge.

Reference Books:

9. Subratha Goshal, "Digital Electronics", Cambridge

10. Comer, “Digital & State Machine Design”, Third Indian edition, OXFORD

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)

B. Tech II Year III Semester

Course Code	Course Title	L	T	P	Credits
20APC0403	SIGNALS & SYSTEMS	3	0	0	3

Course Outcomes:

Upon completion of the course 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
CO4: Understand the properties of systems, response of LTI systems and filters.
CO5: Able to analyz**e** CT LTI systems and DTLTI systems busing 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, Sinc and Gaussian 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

UNIT II: FOURIER SERIES SERIES AND FOURIER TRANSFORMS

Fourier series: Representation of signals using Fourier Series, Trigonometric Fourier series (TFS) and complex exponential Fourier series (CEFS). Illustrative problems. 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 Band pass 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 TRANSFORMS

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, constraints on ROC for various classes of signals, properties of Z-Transforms. Analysis of DT-LTI systems using Z- Transforms: causality and stability. Illustrative problems.

Text Books:

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

Reference Books:

11. Simon Haykin and Van Veen, Signals & Systems, Wiley, 2nd Edition.
12. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms,and Applications, 4 th Edition, PHI, 2007
13. 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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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B. Tech II Year III Semester

COURSE CODE	COURSE TITLE	L	T	P	CREDITS
20AHSMB01	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	3	0	0	3

Course Objective:

The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to enrich analytical skills in helping them take sound financial decisions for achieving higher productivity.

Learning Outcome:

The thorough understanding of Managerial Economics and Analysis of Financial Statements facilitates the Technocrats – cum – Entrepreneurs to take-up decisions effectively and efficiently in the challenging Business Environment.

UNIT 1

INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics - Definition, nature and scope – contemporary importance of Managerial Economics - Demand Analysis: Determinants- Law of Demand - Elasticity of Demand. Significance – types – measurement of elasticity of demand - Demand forecasting- factors governing demand forecasting- methods of demand forecasting –Relationship of Managerial Economics with Financial Accounting and Management.

UNIT 2

THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Short-run and long- run production - Isoquants and Isocosts, MRTS, least cost combination of inputs - Cobb-Douglas production function - laws of returns - Internal and External economies of scale - **Cost Analysis**: Cost concepts - Break-Even Analysis (BEA) - Managerial significance and limitations of BEA - Determination of Break Even Point (Simple Problems)

UNIT 3

INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features, Oligopoly - Monopolistic competition. Price-Output determination - Pricing Methods and Strategies. Forms of Business Organization – Sole Proprietorship- Partnership – Joint Stock Companies – Public Sector Enterprises – New Economic Environment- Economic systems – Economic Liberalization – Privatization and Globalization

UNIT 4

CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Under capitalization – Remedial measures - Sources of Short term and Long term capital - Estimating Working Capital requirement – Capital budgeting – Features of Capital budgeting proposals – Methods and Evaluation of Capital budgeting – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT 5

INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - emerging need and importance - Double-Entry Book Keeping- Journal - Ledger – Trial Balance - Financial Statements - - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Techniques – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

Text Books:

1. Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2009.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.

Reference Books:

1. Premchand Babu, Madan Mohan: Financial Accounting and Analysis, Himalaya, 2009
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International,. 2009.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2009.
4. H. L. Ahuja: Managerial Economics, S. Chand, 3/e, 2009

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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B. Tech II Year III Semester

Course Code	Course Title	L	T	P	Credits
20APC0404	ELECTRONIC DEVICES & CIRCUITS LAB	0	0	3	1.5

Course Outcomes:

Upon completion of the course 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 LABORATORY

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
CO2	PO 2: Problem analysis	2.3	2.3.1
CO3	PO 2: Problem analysis	2.3	2.3.1
CO4	PO 3: Design/Development of solutions	3.3	3.3.1
CO5	PO 3: Design/Development of solutions	3.3	3.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

B. Tech II Year III Semester

Course Code	Course Title	L	T	P	Credits
20APC0405	SIGNALS & SYSTEMS LAB	0	0	3	1.5

Course Outcomes:

Upon completion of the course students will be able to

CO1: Understand basics of MATLAB 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 transforms and Z-transforms.

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 MATLAB or equivalent software

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI (AUTONOMOUS)

B. Tech II Year III Semester

Course Code	Course Title	L	T	P	Credits
20APC0406	SWITCHING THEORY AND LOGIC DESIGN LAB	0	0	3	1.5

Course Outcomes:

Upon completion of the course students will be able to

CO1: Ability to verify all logic gates.
CO2: Ability to Design combinational circuits.
CO3: Ability to design flip flops.
CO4: Ability to design counters.
CO5: Ability to design sequence generator.

LIST OF EXPERIMENTS:

1. Verification of Basic Logic Gates
2. Realization of basic gates using Universal Gates
3. Half adder and Full Adder
4. Half Subtractor and Full Subtractor
5. Parallel Adder/Subtractor
6. Code Converters
7. Encoder/Decoder
8. Flip-Flops
9. Shift Registers
10. Counters
11. Johnson/Ring Counters
12. Sequence Generator

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)
AK20-REGULATIONS

B. Tech II Year III Semester

Course Code	Course Title	L	T	P	Credits
Skill Oriented Course					
20ASC0401	ELECTRONIC CIRCUIT DESIGN	1	0	2	2

Course Outcomes:
Upon completion of the course students will be able to:
CO1: Identify basic Electronic Components
CO2: Understand Fundamentals of Circuit Design.
CO3: Construct different Power Supply circuits.
CO4: Analyze Printed Circuit Boards.
CO5: Design a Electronic circuit as a mini project.

List of Contents

1. IDENTIFICATION OF ELECTRONIC COMPONENTS:
Samples of Wire, Coaxial Cable, Capacitors, Diodes, Fuses, Integrated Circuits, Light Emitting Diodes (LED), Transistors, Resistors, Rectifiers, Zener Diodes, Solder, Transformers, Potentiometer, Photo Resistors.

2. FUNDAMENTALS OF CIRCUIT DESIGN:
Diode applications, Clipping and Clamping Circuits with Diodes, Rectifier Circuits, Transistors, Selection and analysis of Components, sensing devices and display devices.

3. POWER SUPPLY DESIGN:
Introduction to various types of power supplies. Estimation of power supply requirements and power loss in electronic products. Selection of appropriate power supplies for the given primary power sources (230VAC/Battery).

4. EVOLUTION AND CLASSIFICATION OF PRINTED CIRCUIT BOARDS:
Challenges in Modern PCB, Design and Manufacturing, PCB fabrication, PCB design considerations/ design rules for analog, digital and power applications.

5. MINI PROJECT:
Students should complete their Mini Project based on the above concepts.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
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B. Tech II Year III Semester

Course Code	Course Title	L	T	P	Credits
20AMC9901	BIOLOGY FOR ENGINEERS	2	0	0	0

Course Outcomes:

Upon completion of the course students will be able to

CO1: Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.

CO2: Explain about biomolecules, their structure, function and their role in the living organisms. How biomolecules are useful in Industry.

CO3: Brief about human physiology.

CO4: Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.

CO5: 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

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

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

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

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

UNIT V:
APPLICATION OF BIOLOGY

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:

10. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications.
11. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017.

Reference Books:

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

CO No.	PO No. and Keyword	Competency Indicator	Performance Indicator
CO: 1	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 2	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 3	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 4	PO 1: Apply the knowledge of basic science	1.2	1.2.1
CO: 5	PO 1: Apply the knowledge of basic science	1.2	1.2.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI (AUTONOMOUS)

B. Tech II Year IV Semester

Course Code	Course Title	L	T	P	Credits
20AES0509	BASICS OF PYTHON PROGRAMMING	3	0	0	3

Course Objectives:

Upon completion of the course students will be able to

CO1: To learn the fundamentals of Python.
CO2: To elucidate problem-solving using a Python programming language.
CO3: To introduce a function-oriented programming paradigm through python.
CO4: To get training in the development of solutions using modular concepts.
CO5: To introduce the programming constructs of python.

Course Outcomes:

Student should be able to

- Apply the features of Python language in various real applications.
- Select appropriate data structure of Python for solving a problem.
- Design object-oriented programs using Python for solving real-world problems.
- Apply modularity to programs.

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:

12. Allen B. Downey, "Think Python", 2nd edition, SPD/O" Reilly, 2016.

Reference Books:

20. Martin C. Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
21. Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
22. R. Nageswara Rao, "Core Python Programming".

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI (AUTONOMOUS)

B. Tech II Year III Semester

Course Code	Course Title	L	T	P	Credits
20APC0407	PROBABILITY THEORY AND STOCHASTIC PROCESSES	3	0	0	3

Course Outcomes:

Upon completion of the course students will be able to

CO1: Understand the concepts of probability and random variables.

CO2: Understand the concepts of Multiple Random Variables and operations that may be performed on Multiple Random variables.

CO3: Understand the concepts of Random Process and its Temporal Characteristics.

CO4: Understand the concepts of Random Process and its Spectral Characteristics.

CO5: Understand the Spectral characteristics of response of an LTI system.

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, Bays' Theorem, Independent Events: The Random Variable : Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Raleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties.

UNIT II:

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 Distribution, Equal Distributions.

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 Variable.

UNIT III:

RANDOM PROCESSES - TEMPORAL CHARACTERISTICS: Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict- Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation- Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT IV:

RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross- Correlation Function.

UNIT V:

LINEAR SYSTEMS WITH RANDOM INPUTS: Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross- Power Density Spectrums of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties.

Text Books:

13. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", TMH, 4th

Edition, 2001.
14. Athanasios Papoulis and S. Unnikrishna Pillai, “Probability, Random Variables and Stochastic Processes”, PHI, 4th Edition, 2002.

Reference Books:

23. R.P. Singh and S.D. Sapre, “Communication Systems Analog & Digital”, TMH, 1995.
24. Henry Stark and John W. Woods, “Probability and Random Processes with Application to Signal Processing”, Pearson Education, 3rd Edition.
25. George R. Cooper, Clave D. MC Gillem, “Probability Methods of Signal and System Analysis”, Oxford, 3rd Edition, 1999.
26. S.P. Eugene Xavier, “Statistical Theory of Communication”, New Age Publications, 2003.
27. B.P. Lathi, “Signals, Systems & Communications”, B.S. Publications, 2003.

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
CO2	PO 2: Problem analysis	2.3	2.3.1
CO3	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
CO4	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1
CO5	PO 1: Engineering knowledge	1.3	1.3.1
	PO 2: Problem analysis	2.3	2.3.1

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

B. Tech II Year IV Semester

Course Code	Course Title	L	T	P	Credits
20APC0408	ELECTROMAGNETIC THEORY & TRANSMISSION LINES	3	0	0	3

Course Outcomes:

Upon completion of the course 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:

Review of Vector Algebra, coordinate systems, Vector Calculus, 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, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, 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, 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, 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, Poynting Vector, and Poynting Theorem – Applications, Illustrative Problems.

UNIT V:

Transmission Lines: Types, Transmission line parameters (Primary and Secondary), Transmission line equations, Input impedance, Standing wave ratio & power, Smith chart & its applications, Applications of transmission lines of various lengths, Micro-strip transmission lines – input impedance, Illustrative Problems.

Text Books:

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

Reference Books:

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

B. Tech II Year IV Semester

Course Code	Course Title	L	T	P	Credits
20APC0409	ANALOG COMMUNICATION SYSTEMS	3	0	0	3

Course Outcomes:

This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:

CO-1: Acquire knowledge on the basic concepts of Analog Communication Systems.
CO-2: Analyze the analog modulated and demodulated systems.
CO-3: Analyze the performance of the communication system in presence of noise
CO-4: know the working of various transmitters and receivers
CO-5: Know the fundamental concepts of information and capacity.

UNIT I:

INTRODUCTION: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

AMPLITUDE MODULATION & DEMODULATION: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB- SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Quadrature amplitude modulation (QAM), Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Vestigial sideband (VSB) modulator & demodulator, Carrier Acquisition- phased locked loop (PLL), Costas loop, Frequency division multiplexing (FDM), and Super-heterodyne AM receiver, Illustrative Problems.

UNIT II:

ANGLE MODULATION & DEMODULATION: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Verification of Frequency modulation bandwidth relationship, Features of angle modulation, Generation of FM waves –Indirect method, Direct generation; Demodulation of FM, Bandpass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis, & De-emphasis filters, FM receiver, FM Capture Effect, Illustrative Problems**.**

UNIT III:

NOISE IN COMMUNICATION SYSTEMS: Thermal noise, Time domain representation of narrowband noise, Filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems

UNIT IV:

ANALOG PULSE MODULATION SCHEMES: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, PPM spectral analysis, Illustrative Problems.

RADIO RECEIVER MEASUREMENTS: Sensitivity, Selectivity, and fidelity.

UNIT V:

INFORMATION & CHANNEL CAPACITY: Introduction, Information content of message, Entropy, Entropy of symbols in long independent and dependent sequences, Entropy and information rate of Markoff sources, Shannon's encoding algorithm, Discrete communication channels, Rate of information over a discrete channel, Capacity of discrete memoryless channels, Discrete channels with memory, Shannon–

Hartley theorem and its implications, Illustrative problems.

Text Books:

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.

Reference Books:

1. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw- Hill, 3rd Edition, 2009.
3. R.E. Ziemer & W.H. Tranter, "Principles of Communication-Systems Modulation & Noise", Jaico Publishing House, 2001.

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI (AUTONOMOUS)

B. Tech II Year IV Semester

Course Code	Course Title	L	T	P	Credits
20APC0410	ELECTRONIC CIRCUIT ANALYSIS	3	0	0	3

Course Objectives:

Upon completion of the course 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- π Common Emitter transistor model, Validity of hybrid π 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

FEEDBACK AMPLIFIERS: 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.

OSCILLATORS: 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 Colpitt's 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:

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

Reference Books:

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)
B. Tech II Year IV Semester

Course Code	Course Title	L	T	P	Credits
20AES0510	BASICS OF PYTHON PROGRAMMING LAB	0	0	3	1.5

Course Objectives:
Upon completion of the course students will be able to
CO1: To train the students in solving computational problems.
CO2: To elucidate solving mathematical problems using Python programming language.
CO3: To understand the fundamentals of Python programming concepts and its applications.
CO4: To understand the object-oriented concepts using Python in problem solving.

Course Outcomes:
Student should be able to
- Design solutions to mathematical problems.
- Organize the data for solving the problem.
- Develop Python programs for numerical and text based problems.
- Select appropriate programming construct for solving the problem.
- Illustrate object oriented concepts.

LABORATORY EXPERIMENTS
1. Install Python Interpreter and use it to perform different Mathematical Computations. Try to do all the operations present in a Scientific Calculator
2. Write a function that draws a grid like the following**:**

```
+ - - - - + - - - +

|    |         |
|    |         |
|    |         |
|    |         |
+ - - - - + - - - +

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

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 your choice
5. Write a program that draws Archimedean Spiral
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 the alphabet.

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()
1437746094.5735958
```

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 the above.
9. Write a program that evaluates Ackermann function.
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-in functions.
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 or negative.
14. Given rows of text, write it in the form of columns.
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 the same
16. Write program which performs the following operations on list's. Don't use built-in functions
    a) Updating elements of a list
    b) Concatenation of list's
    c) Check for member in the list
    d) Insert into the list
    e) Sum the elements of the list
    f) Push and pop element of list
    g) Sorting of list
    h) Finding biggest and smallest elements in the list
    i) Finding common elements in the list
17. Write a program to count the number of vowels in a word.
18. Write a program that reads a file, breaks each line into words, strips whitespace and punctuation from the words, and converts them to lower case.
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 different eras.

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 the file.
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 same contents.
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 by Python.
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 and failed.
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 year rules.
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)

Reference Books:

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

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

B. Tech II Year IV Semester

Course Code	Course Title	L	T	P	Credits
20APC0411	ANALOG COMMUNICATION SYSTEMS LAB	0	0	3	1.5

Course outcome:

After undergoing the lab course students will be able to:

CO1: Design modulation and demodulation circuits such as AM, PM, FM.
CO2: Design the PAM, PWM&PPM circuits
CO3: Identify and understand different types of antennas, radiation pattern
CO4: Identify and measure Radio receiver measurements the parameters
CO5: Construct pre-emphasis and de-emphasis at the transmitter and receiver respectively

LIST OF EXPERIMENTS: (All Experiments are to be conducted)

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Characteristics of Mixer.
4. Pre-emphasis & de-emphasis.
5. Pulse amplitude modulation & demodulation.
6. Pulse width modulation & demodulation
7. Pulse position modulation & demodulation.
8. Radio receiver measurements – sensitivity selectivity and fidelity.
9. Measurement of half power beam width (HPBW) and gain of a half wave dipole antenna.
10. Measurement of radiation pattern of a loop antenna in principal planes.

EQUIPMENT REQUIRED FOR THE LABORATORY

1. Regulated Power Supply equipment	0 – 30 V
2. CROs	0 – 20 M Hz.
3. Function Generators	0 – 3 M Hz
4. RF Signal Generators	0 – 1000 M Hz
5. Multimeter	

REQUIRED ELECTRONIC COMPONENTS (ACTIVE AND PASSIVE) FOR THE DESIGN OF EXPERIMENTS FROM 1 - 7

1. Radio Receiver Demo kits or Trainers.	
2. RF power meter	frequency range 0 – 1000 MHz
3. Spectrum Analyzer	
4. Dipole antennas (2 Nos.)	850 MHz – 1GHz
5. Loop antenna (1 no.)	850 MHz – 1GHz
6. Bread Boards	

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)

B. Tech II Year IV Semester

Course Code	Course Title	L	T	P	Credits
20APC0412	ELECTRONIC CIRCUIT ANALYSIS LAB	0	0	3	1.5

Course Outcomes:

CO1: The ability to analyze and design single and multistage amplifiers at low, mid and high frequencies.
CO2: Designing and analyzing the transistor at high frequencies.
CO3: Determine the efficiencies of power amplifiers.
CO4: Determine Frequency response and design of tuned amplifiers.
CO5: Able to Analyze all the circuits using simulation software and Hardware.

LIST OF EXPERIMENTS:

(Minimum of Ten Experiments has to be performed both in hardware and software)

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

SOFTWARE REQUIRED FOR LABORATORY

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

EQUIPMENT REQUIRED FOR LABORATORY

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.

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI
(AUTONOMOUS)
AK20-REGULATIONS

B. Tech II Year I Semester

Course Code	Course Title	L	T	P	Credits
Skill Oriented Course					
20ASC0402	INTERNET OF THINGS	1	0	2	2

Course Outcomes:
Upon completion of the course students will be able to:
CO1: Describe characteristics and functionality of IoT
CO2: Understand the types of Sensors.
CO3: Compute the different enabling technologies for Arduino IDE.
CO4: Assemble different electronic components in Development Boards.
CO5: Design an IOT application as a mini project..

List of Contents

1. INTRODUCTION TO IOT
- Characteristics of IoT
- Design Principles of IoT
- IoT Architecture

2. SENSORS
- Sensors Classification
- Working Principle of Sensors
- Criteria to choose a Sensor
- Generation of Sensors

3. BASICS OF ARDUINO
- Introduction to Arduino
- Study of Arduino Board with Specifications
- Basic Commands for Arduino
- Advantages of Arduino

4. EXAMPLES USING ARDUINO
- Digital Sensor using Arduino consists of Development Board, Digital Sensor (Pull-up switch), LED, Connecting wires.
- Development Board, Actuators, Bluetooth Module (HC-05), Connecting wires.

5. MINI PROJECT:
- Students should complete their Mini Project based on the above concepts.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: TIRUPATI
(AUTONOMOUS)
AK20 Regulations

B. Tech II Year IV Semester **Branch Common to all**

Subject Code	Subject Name	L	T	P	Credit: 3
20AHS9905	**Universal Human Values**	3	1	0	

Course Objectives

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence

3. Strengthening of self-reflection.

4. Development of commitment and courage to act.

UNIT – 1**: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current. scenario
- Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

UNIT II**: Understanding Harmony in the Human Being - Harmony in Myself!**

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

UNIT III: **Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship**.

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

UNIT IV: **Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
- Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT- V**: Implications of the above Holistic Understanding of Harmony on Professional Ethics.**

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
- Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Course Outcomes:

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

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

TEXT BOOKS

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCE BOOKS

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. FSchumacher. "Small is Beautiful"
6. Slow is Beautiful –Cecile Andrews
7. J C Kumarappa "Economy of Permanence"
8. Pandit Sunderlal "Bharat Mein Angreji Raj"
9. Dharampal, "Rediscovering India"
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland(English)
13. Gandhi - Romain Rolland (English)

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO 1	**PO 7: Environment and sustainability :** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development	7.1	7.1.2
CO 2	**PO 7: Environment and sustainability :** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and the need for sustainable development	7.1	7.1.2
CO 3	**PO 8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	8.1 8.2	8.1.1 8.2.2
CO 4	**PO 8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	8.1 8.2	8.1.1 8.2.2
CO5	**PO 8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	8.1 8.2	8.1.1 8.2.2