Annamacharya Institute of Technology and Sciences, Tirupati

Course structure for Four Year Regular B.Tech. Degree Program

(Effective for the batches admitted from 2019-20)

CIVIL ENGINEERING (CE)

I B. Tech – I Semester

INDUCTION PROGRAM (3 weeks duration)

- ❖ Physical activity
- ❖ Creative Arts
- ❖ Universal Human Values
- ❖ Literary
- ❖ Proficiency Modules
- ❖ Lectures by Eminent People
- ❖ Visits to local Areas
- ❖ Familiarization to Dept./Branch & Innovations

I B. Tech – I Semester

S.No	Category	Course Code	Course Title	L	T	P	Credits	CIE	SEE	Total
				Hours per week				Scheme of Examination (Max. Marks)		
				THEORY						
1	BSC	19ABS9901	Algebra and calculus	3	1	0	4	30	70	100
2	BSC	19ABS9903	Engineering Physics	3	0	0	3	30	70	100
3	ESC	19AES0501	Problem solving and programming	3	1	0	4	30	70	100
4	HSC	19AHS9901	Communicative English-I	2	0	0	2	30	70	100
			PRACTICAL							
5	BSC	19ABS9908	Engineering Physics Lab	0	0	3	1.5	30	70	100
6	ESC	19AES0503	Problem solving and programming Lab	0	0	4	2	30	70	100
7	HSC	19AHS9902	Communicative English-I Lab	0	0	2	1	30	70	100
8	LC	19ALC0301	Engineering Workshop	0	0	2	1	30	70	100
			Total				18.5	240	560	800

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Year : I   **Semester** : I   **Branch of Study : Common to all**

Subject Code:19ABS9901	Subject Name: **Algebra & Calculus**	L T P 3 0 0	Credits: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 of special functions

Unit I : Matrix Operations and Solving Systems of Linear Equations
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, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit II : Mean Value Theorems
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
Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Unit IV: Double Integrals
Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves.

Unit V: Multiple Integrals and Special Functions
Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

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

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. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.

4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO1: Apply the knowledge of mathematics	1.1	1.1.1
CO 2	PO1:Apply the knowledge of mathematics	1.1	1.1.1
CO 3	PO1: Apply the knowledge of mathematics	1.1	1.1.1
CO 4	Po2 : analyse complex engineering problems	2.1	2.1.3
CO 5	Po2 : analyse complex engineering problems	2.1	2.1.3

Year : I	Semester : I	Branch of Study : ME & CE			

Subject Code:19ABS9903	Subject Name: **Engineering Physics**	L 3	T 0	P 0	Credits:3

Course Outcomes:
1. Explain physics applied to solve engineering problems
2. Apply the principles of acoustics in designing of buildings
3. Explains the applications of ultrasonics in various engineering fields
4. Apply electromagnetic wave propagation in different Optical Fibers and the concepts of lasers in various applications.
5. Explains the concepts of dielectric and magnetic materials and Identify the sensors for various engineering applications

Unit I : Mechanics
Basic laws of vectors and scalars – rotational frames-conservative forces- F=-gradV, torque and angular momentum-Newton's laws in inertial and linear accelerating non-inertial frames of reference-rotating frame of reference with constant angular velocity-qualitative explanation of Foucault's pendulum-rigid body-angular velocity vector-center of mass-gravitation and Keplar's Law (Qualitative).

Unit II : Crystallography And Ultrasonics
Crystallography – Introduction – Space Lattice – Unit Cell – Lattice Parameters – Bravais Lattice – Crystal Systems – Packing Fractions of SC, BCC and FCC. X-Ray Diffraction – Braggs Law – Powder Method.
Ultrasonics–Introduction, Properties and Production by magnetostriction & piezoelectric methods - acoustic grating-Non Destructive Testing–pulse echo system through transmission and reflection modes-A,B and C–scan displays, Medical applications.

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

Unit IV: Lasers and Fiber Optics
Introduction-Characteristics of Laser – Spontaneous and Stimulated emission of radiation-Einstein's coefficients-Population inversion-Pumping Mechanisms -He- Ne laser, Nd-YAG laser-Semiconductor laser-Applications of laser.
Introduction to Optical Fibers – Total Internal Reflection-Construction of optical fibers, Critical angle of propagation – Acceptance angle – Numerical Aperture-Classification off ibers based on Refractive index profile & modes – Propagation of electromagnetic wave through optical fiber-importance of V number-Block Diagram of Fiber optic Communication system-Medical Applications.

Unit V: Nanomaterials
Introduction – Significance of nanoscale and types of nanomaterials – Physical properties, optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top

down and bottom up approaches, ball mill, chemical vapour depositon and sol-gel – Appliations 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. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics",Pearson Education,2018

References:
1. K.Thyagarajan "Engineering Physics",-Mc Graw Hill Publishing Company Ltd,2016
2. MKVarma "Introduction to Mechanics"-Universities Press-2015.
3. D.K. Bhattacharya and A.Bhaskaran,"Engineering Physics"-Oxford Publications-2015
4. IanRSinclair,Sensor andTransducers,3rd eds,2001,Elsevier(Newnes)

List of COs	PO no. and keyword	Competency	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

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| Year : I | Semester : I | Branch of Study : Common to All |

Subject Code:19AES0501	Subject Name: Problem Solving and Programming	L 3	T 1	P 0	Credits: 3

Course outcomes: Student should be able to
1. Create interactive visual programs using Scratch.
2. Develop flowcharts using raptor to solve the given problems.
3. Develop Python programs for numerical and text based problems
4. Develop graphics and event based programming using Python
5. Develop Python programs using beautiful Pythonic idiomatic practices

Unit – 1: Visual Programming through Scratch and App Inventor

Introduction to programming concepts with scratch, Scratch environment, sprites looks and motion, Angles and directions, repetition and variation, changing costumes, adding background, Input/Output, variables and operators. Working with sounds and sprite communication and creating stories, App Generation.

Unit – 2: Flowchart design through Raptor

Flow chart symbols, Input/Output, Assignment, operators, conditional if, repetition, function and sub charts. Example problems(section 1) – Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers

Example problems(section 2) - Fibonacci generation, prime number generation. Minimum, Maximum and average of n numbers, Linear search, Binary Search.

Unit – 3 : Introduction to Python

Python – Numbers, Strings, Variables, operators, expressions, statements, String operations, Math function calls, Input/Output statements, Conditional If, while and for loops, User defined Functions, parameters to functions, recursive functions, Turtle Graphics.

Unit – 4 : Data Structures and Idiomatic Programming in Python

Lists, Tuples, Dictionaries, Strings, Files and their libraries. Beautiful Idiomatic approach to solve programming problems.

Unit – 5 : Event driven Programming

Turtle Bar Chart, Event Driven programming. Key press events, Mouse events, timer events.

Text Book:
https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf
https://nostarch.com/scratchplayground
http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf
https://raptor.martincarlisle.com/
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

List of COs	PO no. and keyword	Competency	Performance Indicator
CO1	PO3: Design/Development of Solutions	3.1	3.1.4
CO2	PO3: Design/Development of Solutions	3.1	3.1.4
CO3	PO2: Problem analysis	2.2	2.2.2
CO4	PO2: Problem analysis PO3: Design/Development of Solutions	2.2 3.1	2.2.2 3.1.4
CO5	PO3: Design/Development of Solutions	3.1	3.1.4

Year : I   **Semester** : I   **Branch of Study : Common to All**

Subject Code: **19AHS9901**	Subject Name: **Communicative English I**	L T P 2 0 0	Credits:2

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.**

Unit 1 :   Technology With a Human Face - Schumacher

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: 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: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.
Unit 2:   I have three vision for India: **Presidential Speech by Abdul Kalam**
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:** 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 Gold Frame by   RK. Laxman

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: 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:   To be, or not to be by William Shakesphere

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: 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: The Accompanist by Anitha Desai

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:** 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)

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO6: Engineer and Society	6.1	6.1.1
CO 2	PO10: Communication	10.1	10.1.1
CO 3	PO9: Individual and Teamwork	9.2	9.2.1
CO 4	PO10: Communication	10.1	10.1.1
CO 5	PO10: Communication	10.3	10.3.1

Year : I	Semester : I	Branch of Study : Common to ME & CE				

Subject Code:19ABS9908	Subject Name: **Engineering Physics Lab**	L T P 0 0 3	Credits:1.5

Course Outcomes:

1. Operate various optical instruments and Estimate wavelength of laser and particles size using laser
2. Estimate the susceptibility and related magnetic parameters of magnetic materials and plot the intensity of the magnetic field of circular coil carrying current with distance
3. Evaluate the acceptance angle of an optical fiber and numerical aperture and determine magnetic susceptibility of the material and its losses by B-H curve
4. Identify the type of semiconductor i.e., n-type or p-type using Hall effect
5. Apply the concepts of sensors for various applications

List of Experiments

1. Determination of wavelength of LASER light using diffraction grating.
2. Determination of particle size using LASER.
3. Determination of spring constant of springs using Coupled Oscillator.
4. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
5. Determination of Dielectric constant of dielectric material using charging and discharging of capacitor.
6. Magnetic field along the axis of a circular coil carrying current.
7. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)
8. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
9. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
10. Measurement of magnetic susceptibility by Gouy's method
11. Determination of ultrasonic velocity in liquid (Acoustic grating)
12. Determination of pressure variation using Strain Guage sensor
13. Determination of temperature change using Strain Guage sensor.
14. Determination of pressure variations using optical fiber sensors.
15. Determination of temperature changes using optical fiber sensors.

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	Performance Indicator
CO 1	PO 4: Conduct Investigations of complex problems	4.3	4.3.3
CO 2	PO 4: Conduct Investigations of complex problems	4.3	4.3.1
CO 3	PO 4: Conduct Investigations of complex problems	4.3	4.3.1
CO 4	PO 4: Conduct Investigations of complex problems	4.3	4.3.2
CO 5	PO 4: Conduct Investigations of complex problems	4.3	4.3.2

Year : I   **Semester** : I   **Branch of Study : Common to All**

Subject Code: 19AES0503	Subject Name: Problem Solving and Programming Lab	L T P 0 0 3	Credits: 1.5

Course outcomes: Student should be able to
1. Create interactive visual programs using Scratch.
2. Develop flowcharts using raptor to solve the given problems.
3. Develop Python programs for numerical and text based problems
4. Develop graphics and event based programming using Python
5. Develop Python programs using beautiful Pythonic idiomatic practices

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.
3. Design a Memory Game in Scratch which allows the user to identify positions of similar objects in a 3 x 3 matrix.
4. Construct flowcharts to
   a. calculate the maximum, minimum and average of N numbers
   b. develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
5. Construct flowcharts with separate procedures to
   a. calculate simple and compound interest for various parameters specified by the user
   b. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
6. Construct flowcharts with procedures to
   a. generate first N numbers in the Fibonacci series
   b. generate N Prime numbers
7. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
8. Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
9. Design a flowchart to determine the number of characters and lines in a text file specified by the user
10. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
11. Design a Python script to determine if a given string is a Palindrome using recursion
12. Design a Python script to sort numbers specified in a text file using lists.
13. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format($0 \le YYYY \le 9999$, $1 \le MM \le 12$, $1 \le DD \le 31$) following the leap year rules.
14. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
15. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.($0 \le HH \le 23$, $0 \le MM \le 59$, $0 \le SS \le 59$)
16. Design a Python Script to find the value of (Sine, Cosine, Log, PI, e) of a given number using infinite series of the function.
17. Design a Python Script to convert a given number to words

18. Design a Python Script to convert a given number to roman number.
19. Design a Python Script to generate the frequency count of words in a text file.
20. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
21. Design a Python Script to implement Gaussian Elimination method.
22. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
23. 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 categorising them into distinction, first class, second class, third class and failed.

Text Book:
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

List of COs	PO no. and keyword	Competency	Performance Indicator
CO1	PO3: Design/Development of Solutions	3.1	3.1.4
CO2	PO3: Design/Development of Solutions	3.1	3.1.4
CO3	PO2: Problem analysis	2.2	2.2.2
CO4	PO2: Problem analysis PO3: Design/Development of Solutions	2.2 3.1	2.2.2 3.1.4
CO5	PO3: Design/Development of Solutions	3.1	3.1.4

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES: TIRUPATI

Year I **Semester** I **Branch of Study: Common to All**

Subject Code 19AHS9902	Subject Name **Communicative English I Lab**	L 0	T 0	P 3	Credits:1.5

Course Outcomes:

CO1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO2: Apply communication skills through various language learning activities.
CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4: Evaluate and exhibit acceptable etiquette essential in social and professional settings.
CO5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

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

List of COs	PO No. and keyword	Competency	Performance Indicator
CO 1	PO10: Communication	10.2	10.1.1
CO 2	PO10: Communication	10.3	10.3.1
CO 3	PO10: Communication	10.2	10.2.1
CO 4	PO 9: Individual & Team Work	9.2	9.2.1
CO 5	PO10: Communication	10.2	10.2.1

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Year: I   **Semester: I**   **Branch of Study: Common to all branches**

Subject Code	Subject Name	L	T	P	Credits
19ALC0301	Basic Engineering Workshop	0	0	3	1.5

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:
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:
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