

## Semester II (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week				Credits	Scheme of Examination (Max. Marks)		
				L	T	P	C		CIE	SEE	Total
1	Basic Science courses	20ABS9906	Differential Equations and Vector Calculus	3	0	0	3	30	70	100	
2	Basic Science courses	20ABS9903	Engineering Physics	3	0	0	3	30	70	100	
3	Engineering Science Courses	20AES0202	Basics of Electrical and Electronics Engineering	3	0	0	3	30	70	100	
4	Engineering Science Courses	20AES0509	Basics of Python Programming	3	0	0	3	30	70	100	
5	Engineering Science Courses	20AES0301	Engineering Graphics	1	0	4	3	30	70	100	
6	Engineering Science Courses (LAB)	20AES0204	Basics of Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100	
7	Basic Science course (LAB)	20ABS9908	Engineering Physics Lab	0	0	3	1.5	30	70	100	
8	Engineering Science Courses (LAB)	20AES0510	Basics of Python Programming Lab	0	0	3	1.5	30	70	100	
9	Mandatory course (AICTE suggested)	20AMC9902	Constitution of India	2	0	0	0	30	-	30	
<b>Total credits</b>								<b>19.5</b>	<b>270</b>	<b>560</b>	<b>830</b>

Year: I		Semester: II			
Subject Code <b>20ABS9906</b>	Subject Name: <b>Differential Equations and Vector Calculus</b>	<b>L</b>	<b>T</b>	<b>P</b>	Credits:3
		<b>3</b>	<b>0</b>	<b>0</b>	

**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 ( $e^{ax}$ ,  $\sin ax$  (or)  $\cos ax$ ,  $X^k$ ,  $e^{ax}v$ ,  $x v(x)$ ), 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, 44<sup>th</sup> Edition, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> 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.

<b>List of Cos</b>	<b>PO no. and keyword</b>	<b>Competency Indicator</b>	<b>Performance Indicator</b>
CO1	PO1:Apply the knowledge of mathematics	1.1	1.1.1
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

Year: I

Semester: II

Subject Code:20ABS9903	Subject Name: <b>Engineering Physics</b>	L 3	T 0	P 0	Credits:3
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**Course Outcomes**

1. Explain physics applied to solve engineering problems.
2. Apply the principles of acoustics and ultrasonics in engineering applications.
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****8 Hrs**

Basic laws of vectors and scalars –Conservative and non-conservative forces- Vector differentiation and Gradient,  $F = - \text{grad}V$  - Angular momentum and Torque-Conservation of Energy, Momentum and Angular Momentum - motion of variable mass system, motion of a rocket -Moment of Inertia-radius of Gyration-Gravitational Force, Field and Potential- Kepler`s Laws-Proof of Kepler`s laws.

**Unit II : Acoustics and Ultrasonics**

Introduction to Acoustics – Reverberation – Reverberation time– Sabine`s formula- Derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.

Introduction to Ultrasonics – Production of Ultrasonic wave by magnetostriction & piezoelectric methods – Properties-acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, 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-Mossotti equation-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 lasers.

Introduction to Optical Fibers – Total Internal Reflection-Construction of optical fibers, Critical angle of propagation – Acceptance angle – Numerical Aperture-Classification of fibers based on Refractive index, profile & modes – Propagation of electromagnetic wave through optical fiber-importance of V number-Block Diagram of Fiber optic Communication system-Industrial Applications.

**Unit V: Sensors**

Sensors:(qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magnetostrictive sensors, Fibre optic methods of pressure sensing; Temperature sensors - bimetallic strip, pyroelectric detectors, Hall-effect sensor, smoke and fire detectors.

**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,3<sup>rd</sup> eds,2001,Elsevier(Newnes).

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

## Year: I

## Semester: II

Subject Code	Subject Name	L	T	P	Credits
20AES0202	Basics of Electrical & Electronics Engineering	3	0	0	3

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

CO 1: Apply concepts of KVL/KCL in solving DC circuits

CO 2: Illustrate working principles of induction motor - DC Motor

CO 3: Identify type of electrical machine based on their operation

CO 4: Describe operation and characteristics of diodes and transistors.

CO 5: Make use of diodes and transistors in simple, typical circuit applications.

CO 6: Understand operation of basic op-amp circuits.

### PART-A (Electrical Engineering)

#### UNIT-I: DC & AC Circuits:

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

#### UNIT-II: DC & AC Machines:

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [ Elementary treatment only ]

#### UNIT-III: Basics of Power Systems:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

#### Text Books:

1. D. P. Kothari and I. J. Nagrath - “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, “Principles of Power System” – S.Chand – 2018.

**References:**

1. L. S. Bobrow - "Fundamentals of Electrical Engineering" - Oxford University Press - 2011.
2. E. Hughes - "Electrical and Electronics Technology" - Pearson - 2010.
3. C.L. Wadhwa – "Generation Distribution and Utilization of Electrical Energy", 3rd Edition, New Age International Publications.

**PART-B (Electronics Engineering)****UNIT-I: Analog Electronics**

Overview of Semiconductors, PN junction diode, Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, special purpose diodes: schottky diode, tunnel diode, varactor diode, photodiode, phototransistor and LED.

BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications

Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.

**UNIT II: Digital Electronics**

Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems, combinational circuits - adders, multiplexers, decoders; introduction to sequential circuits, flip flops, shift register, binary counter

**UNIT III: Communication Systems**

Introduction, Elements of Communication Systems, EM spectrum, basics of electronic communication, Amplitude and Frequency modulation, Pulse modulation, Communication receivers, Examples of communication systems: Microwave & Satellite, Fibre optic, Television, mobile communication (block diagram approach).

**Text Books:**

1. D.P. Kothari, I.J.Nagrath, Basic Electronics, 2<sup>nd</sup> edition, McGraw Hill Education(India)Private Limited
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2<sup>nd</sup> edition, Pearson India Private Limited.

**References:**

1. R. Muthu subramanian, S. Salivahanan, "Basic Electrical and Electronics Engineering", Tata McGraw-Hill Education, Reprint 2012.
2. David Bell, Electronic Devices and Circuits: Oxford University Press, 5th edition. 2008.

**Note: This table also should be in portrait only**

CO	PO	CI	PI
CO1	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO2	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO3	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO4	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO5	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO6	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1



Year: I

Semester:II

Subject Code	Subject Name	L	T	P	Credits
<b>20AES0509</b>	<b>Basics of Python Programming</b>	3	0	0	3

Course Objectives:

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

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, The `__str__` method, 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.

#### 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.

#### Text books:

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

#### Reference Books:

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

**Year: I****Semester: II**

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.

- Conic sections including the rectangular hyperbola- general method only,
- Cycloid, epicycloids and hypocycloid
- 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:**

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

**Additional Sources**

YouTube: <http://sewor.carleton.ca/gkardos/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

**AK20 Regulations**

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI**  
 (Autonomous)  
 Course structure for Four Year Regular B.Tech. Degree Program  
 (Effective for the batches admitted from 2020-21)  
**CIVIL ENGINEERING (CE)**

**Year: I**

**Semester: II**

Subject Code	Subject Name	L	T	P	Credits
<b>20AES0204</b>	<b>Basics of Electrical &amp; Electronics Engineering Lab</b>	0	0	3	1.5

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

CO1: Verify Kirchoff's Laws & Superposition theorem for dc supply

CO2: Analyze the performance of AC and DC Machines by testing.

CO3: Study I – V Characteristics of PV Cell & Perform speed control of dc shunt motor

CO4: Ability to operate diodes for finding V-I Characteristics.

CO5: Ability to construct and operate rectifiers without & with filters

CO6: Ability to construct and operate BJT & FET Characteristics.

**List of Experiments:**

**PART-A**

1. Verification of Kirchoff laws.
2. Verification of Superposition Theorem.
3. Open circuit characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Brake test on 3 - Phase Induction Motor.
7. Brake test on DC Shunt Motor

**PART-B**

1. PN Junction Diode Characteristics.
2. Zener Diode Characteristics.
3. Rectifiers (With and Without Filter).
4. BJT Characteristics (CB Configuration).
5. BJT Characteristics (CE Configuration).
6. FET Characteristics (CS Configuration).

**Table: Course Outcomes (CO), Programme Outcomes (PO), Competency Indicator (CI) and Performance Indicator (PI) Mapping**

CO	PO	CI	PI
CO1	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO2	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO3	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO4	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1
CO5	PO1	1.3	1.3.1
	PO2	2.3	2.3.1
	PO3	3.3	3.3.1

**AK20 Regulations**

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI**  
(Autonomous)  
Course structure for Four Year Regular B.Tech. Degree Program  
(Effective for the batches admitted from 2020-21)  
**CIVIL ENGINEERING (CE)**

**Year: I**

**Semester: II**

Subject Code:20ABS9908	Subject Name: <b>Engineering Physics Lab</b>	L	T	P	Credits:1.5
		0	0	3	

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

Year: I

Semester: II

Subject Code	Subject Name	L	T	P	Credits
20AES0510	Basics of Python Programming Lab	0	0	3	1.5

Lab 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 January 1970.

```
>>> 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  $n+r+1 \leq 2r$ .  $n$  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  $1/\pi$ :

Write a function called `estimate_pi` that uses this formula to compute and return an estimate of  $\pi$ .

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

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 letter (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 lowercase.

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( $0 \leq \text{YYYY} \leq 9999$ ,  $1 \leq \text{MM} \leq 12$ ,  $1 \leq \text{DD} \leq 31$ ) following the leap year rules.
26. Design a Python Script to determine the time difference between two given times in HH:MM:SS format. ( $0 \leq \text{HH} \leq 23$ ,  $0 \leq \text{MM} \leq 59$ ,  $0 \leq \text{SS} \leq 59$ )

**Reference Books:**

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition,  
Available at <http://www.ict.ru.ac.za/Resources/espw/thinkcspy3/thinkcspy3.pdf>
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016

**AK20 Regulations**

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI**  
(Autonomous)  
Course structure for Four Year Regular B.Tech. Degree Program  
(Effective for the batches admitted from 2020-21)  
**CIVIL ENGINEERING (CE)**

**B.Tech- I Year**

**Semester: II**

<b>Subject Code</b> 20AMC9902	<b>Subject Name</b> CONSTITUTION OF INDIA	<b>L</b> 2	<b>T</b> 0	<b>P</b> 0	<b>Credits: 0</b>
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**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