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)

II 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	19ABS9915	Transform Techniques and Numerical Methods	3	0	0	3	30	70	100
2	ESC	19AES0509	Basics of Python Programming	2	0	0	2	30	70	100
3	PCC	19APC0107	Strength of Materials	3	0	0	3	30	70	100
4	PCC	19APC0108	Hydraulic Engineering	3	0	0	3	30	70	100
5	PCC	19APC0109	Structural Analysis – I	3	0	0	3	30	70	100
6	PCC	19APC0110	Concrete Technology	3	0	0	3	30	70	100
7	MC	19AMC9903	Environmental Studies	2	-	-	-	30	-	30
PRACTICAL										
8	ESC	19AES0510	Basics of Python Programming Lab	0	0	2	1.0	30	70	100
9	PCC	19APC0111	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	1.5	30	70	100
	PCC	19APC0112	Concrete Technology Lab	0	0	3	1.5	30	70	100
11	PRC	19APR0101	Socially Relevant Project (15 Hrs/Sem)	0	0	1	0.5	50	-	50
TOTAL							21.5	350	630	980

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Autonomous

AK 19 Regulations

Year : II **Semester** : II **Branch of Study :** CE and ME

Subject Code:**19ABS9915**	Subject Name: **Transform Techniques and Numerical Methods**	L T P 3 0 0	Credits:3

Course Outcomes:

1) Apply the Laplace transform for solving differential equations (continuous systems)
2) Find the Fourier series of periodic signals
3) Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
4) Solve linear/nonlinear algebraic and transcendental equations using numerical methods
5) Solve ordinary differential equations by Euler's method, modified Euler's method, Runge Kutta method, Predictor Corrector method and Milne's method

Unit 1: 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 lI : Fourier series:

Dirichlet's conditions, Fourier series, conditions for a Fourier expansion, functions of any period, odd and even functions - half range series.

Unit IIl :Fourier transforms:

Fourier integrals, Fourier cosine and sine integrals, Fourier transform, sine and cosine transform, properties, convolution theorem

Unit IV: Solution to algebraic equations

Solution of polynomial and transcendental equations: bisection method, Newton-Raphson method and Regula-Falsi method. finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Unit V: Numerical differentiation and integration

Numerical Differentiation, numerical integration- trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006

References

1. T.K.V.Iyengar, B.Krishna Gandhi and others, Engineering Mathematics-II,& Probability and Statistics, S.Chand Publishers
2. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

List of COs	PO no. and keyword	Competency Indicator	Performance Indicator
CO1	PO1: Apply the knowledge of mathematics	1.1	1.1.2
CO2	PO1:Apply the knowledge of mathematics	1.1	1.1.2
CO3	PO 2: First principles of mathematics.	2.2	2.2.2
CO4	PO1: Knowledge of mathematics	1.3	1.3.1
CO5	PO1: Knowledge of mathematics	1.1	1.1.1

Year: II **Semester: II** **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19AES0509	**Basics of Python Programming**	2	0	0	2

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

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Year: II **Semester: II** **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0107	Strength of Materials	3	0	0	3

Course Outcomes:

1: Identify critical planes in two dimensional stress systems
2: Compute slopes and deflections of beams with different boundary conditions
3: Determine shear stresses for different shapes.
4: Analyze members under torsion, combined torsion and bending moment for determination of energy absorption
5: Determine the Load carrying capacity of column by using different approaches

UNIT – I

Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/Y = E/R$ – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hallow), I, T, Angle and Channel Sections – Design of simple beam sections.

UNIT – II

Shear Stresses: Derivation of formula-Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections. Combined bending and shear.
Combined Direct and Bending stresses: Introduction-eccentric loading – columns with eccentric loading – symmetrical columns with eccentric loading about one axis –about two axes – Unsymmetrical columns with eccentric loading – limit of eccentricity.

UNIT – III

Columns and Struts: Introduction – classification of columns – Axially loaded compression members – Euler's crippling load theory – derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula.

UNIT – IV

Torsion: Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – power transmission through shafts – Combined bending and torsion.

UNIT – V

Compound Stresses and Strains: Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain.
Theories of Failures: Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

TEXT BOOKS:

R.K Bansal, Engineering Mechanics, Lakshmi Publications.
R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd.
R. Subramanian, Strength of Materials, Oxford University Press.

REFERENCES:

S.S. Bhavakatti, Engineering Mechanics, New Age Publishers.
S. Timoshenko, D.H. Young and J.V. Rao, Engineering Mechanics, Tata McGraw-Hill Company.
Sadhu Singh, Strength of Materials, Khanna Publishers 11th edition 2015.

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Year: II **Semester: II** **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0108	Hydraulic Engineering	3	0	0	3

Course Outcomes:

1: Understand Laminar Flow and Turbulent flow through plates

2: Understand different formulae on open channel flow and design open-channel flow systems.

3: Understand the concepts of varying flow in pipes and Measure discharge and velocity

4: Understand hydrodynamic force of jets different vanes and design Pelton wheel, Francis and Kaplan turbine

5: Understand principles of centrifugal pumps and Calculate losses and efficiencies of centrifugal pumps

UNIT – I:

Laminar & Turbulent flow in pipes: Laminar Flow- Laminar flow through: circular pipes. Stoke's law, Measurement of viscosity. Turbulent Flow-Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability.,

UNIT – II:

Uniform flow in Open Channels: Open Channel Flow-Comparison between open channel flow and pipe flow, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Chezy's formula, Manning's formula. Computation of Uniform flow.

UNIT – III:

Non-Uniform flow in Open Channels: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity. Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification.

UNIT – IV:

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - velocity triangles at inlet and outlet - Work done and efficiency.

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design – efficiency - Draft tube: theory - characteristic curves of hydraulic turbines.

UNIT -V:

Centrifugal pumps: Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Dimensional analysis and hydraulic similitude.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House

2. D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria & Sons.

REFERENCES:

1. Rajput, Fluid mechanics and fluid machines , S. Chand & Co

2. K. Subramanya, Open channel Flow, Tata McGraw Hill.

3. Srinivasan, Open channel flow by, Oxford University Press

4. Banga & Sharma, Hydraulic Machines, Khanna Publishers.

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II - Year **Semester -II** **Branch of Study - CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0109	Structural Analysis-I	3	0	0	3

Course Outcomes

1. Apply energy theorems for analysis of indeterminate structures
2. Analyze indeterminate structures with yielding of supports
3. Analyze beams using slope deflection distribution method
4. Analyze beams using moment distribution methods
5. Analyze the Determinate and Indeterminate trusses

UNIT – I

Fixed Beams: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies- Analysis of fixed beams - uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load and combination of loads – Shear force and Bending moment diagrams – effect of sinking of support, effect of rotation of a support.

UNIT – II

Slope-Deflection Method: Introduction- derivation of slope deflection equation- application to continuous beams with and without settlement of supports.

UNIT – III

Moment Distribution Method: Introduction to moment distribution method- application to continuous beams with and without settlement of supports.

UNIT – IV

Energy Theorems: Strain energy – Resilience – Gradual, Sudden and impact loadings – simple applications. Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear force – Castigliano's first theorem -Deflections of simple beams (Determinate beams).

UNIT – V

Analysis of Determinate and Indeterminate Trusses: Analysis of Determinate trusses by method of joints - Analysis of Indeterminate trusses with single degree internal and external indeterminacy – Castigliano's theorems.

Text Books:

1. S.S. Bhavikatti, "Structural Analysis", Volume 1 and 2, Vikas Publishing House, Pvt. Ltd.
2. S. Ramamurtham, "Theory of Structures", Dhanpat Rai Publishing Company (p) Ltd, 2009
3. C. S. Reddy, "Basic Structural Analysis", Tata McGraw Hill

References:

1. Timoshenko & Young, "Theory of Structures", Tata McGraw Hill
2. S. B. Junarkar, "Structural Mechanics" Vol I & II, Charotar Publishers
3. C. K. Wang, "Intermediate Structural Analysis", McGraw Hill

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Year: II **Semester: II** **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0110	Concrete Technology	3	0	0	3

Course Outcomes: After the completion of the course student should be able to

1. Understand various ingredients of concrete and their role.
2. Examine knowledge on the fresh and hardened properties of concrete.
3. Design concrete mixes using various methods.
4. Understand the durability problems and remedial measure in the concrete.
5. Perform mix design and engineering properties of normal concrete.

UNIT I

Cement: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Tests on physical properties – Different grades of cement. Admixtures: Types of admixtures – mineral and chemical admixtures.

UNIT - II

Aggregates: Classification of aggregate – Particle shape & texture- properties of aggregate – Specific gravity, Bulk density, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substance in aggregate - Alkali aggregate reaction – Sieve analysis – Fineness modulus – Grading curves –Grading of Aggregates – Maximum aggregate size

UNIT – III

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by slump and compaction factor test – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

Hardened Concrete: Water / Cement ratio – Abram's Law – Gain of strength of concrete – Strength in tension and compression – Factors affecting strength – Relation between compression and tensile strength - Curing.

UNIT - IV

Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength –
Flexure tests – Splitting tests - Non-destructive testing methods - UPV and Rebound Hammer tests.

Elasticity, Creep & Shrinkage: – Static Modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Shrinkage – types of shrinkage.

UNIT – V

Mix Design: Factors in the choice of mix proportions – Quality Control of concrete – Proportioning of concrete mixes by various methods – BIS method of mix design.

Durability of concrete and Concrete Construction: Durability concept - Permeability of concrete - reinforcement corrosion – chemical attack-methods to increasing durability of concrete.

TEXT BOOKS:

1. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004
2. Concrete Technology by A.R. Santhakumar, 2nd Edition, Oxford university Press, New Delhi
3. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

REFERENCES:

1. Properties of Concrete by A. M. Neville – Low priced Edition – 4th edition
2. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, Mc-Graw Hill Publishers

IS Codes:

IS 383, IS 516, IS 10262 – 2009

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Year: II **Semester: II** **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19AMC9903	Environmental Studies	2	0	0	0

Course Outcomes

1. Students get sufficient information that clarifies modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
2. Students realize the need to change their approach, so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
3. Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
4. . Interpretation of different types of environmental pollution problems and designing of new solid waste management techniques usage
5. To get knowledge on various environmental acts and to engage all the students life - long learning of rain water harvesting

UNIT – I **18Hr**

Multidisciplinary Nature o**f Environmental Studies:** Introduction − Multidisciplinary Nature of Environmental Studies − Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable energy resources – Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and sub-surface – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.

Energy resources: Renewable and non-renewable energy resources.

UNIT – II **20Hr**

Ecosystems: Concept of an ecosystem. – Structure and functions of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Biodiversity And Its Conservation : Introduction- Definition: genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man − wildlife conflicts − Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III **10Hr**

Environmental Pollution: Definition, Causes, effects and its control measures of : Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards.

Solid Waste Management: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone, Tsunami and landslides.

UNIT – IV **15Hr**

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting and watershed management – Resettlement and rehabilitation of people − Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies– Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act − Public awareness.

UNIT – V **10Hr**

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

TEXT BOOKS:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Kaushik, New Age Publishers.
3. Environmental Studies by Sri Krishna Hitech publishing Pvt. Ltd.

REFERENCES:

1. Environmental studies by R.Rajagopalan, Oxford University Press.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.
4. Environmental studies by A. Ravi Krishnan, G. Sujatha Sri Krishna Hitech publications.

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

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Year: II **Semester: II** **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19AES0510	**Basics of Python Programming Lab**		0	2	1

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 <= 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 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 <= 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:

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/cspw/thinkcspy3/thinkcspy3.pdf
2. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
3. Dainel Y.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

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Year: II **Semester: II** **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0111	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	1.5

Course outcomes:

1: Calibrate flow measuring devices such as Venturimeter, orifice meter and notch
2: Verify Bernoulli's theorem
3: Analyze a variety of practical fluid-flow devices and utilize fluid mechanics principles in design
4: Conduct experiments (in teams) in pipe flows and open-channel flows and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports
5: To provide the students knowledge in calculating performance analysis in turbines and pumps and can be used in power plants

LABORATORY EXPERIMENTS

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Verification of Bernoulli's equation.
8. Impact of jet on vanes.
9. Study of Hydraulic jump.
10. Performance test on Pelton wheel turbine.
11. Performance test on Francis turbine.
12. Efficiency test on centrifugal pump.

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Year: II **Semester: II** **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0112	Concrete Technology Lab	0	0	3	1.5

1. Determine the properties of cement as per IS specifications.
2: Determine the properties of aggregates as per IS specifications.
3: Determine the properties of fresh concrete as per IS specifications.
4: Determine the properties of hardened concrete as per IS specifications.
5: Determine the strength of concrete using Rebound hammer method.

List of Experiments

1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Young‟s modulus, Tensile and compressive strength of concrete.
7. Specific Gravity and Water Absorption of Coarse aggregate.
8. Bulking of Fine aggregate.
9. Specific Gravity and Water Absorption of fine aggregate.
10. Grain size distribution of coarse aggregate and fine aggregate
11. Non-Destructive testing on concrete (for demonstration)