

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)

MECHANICAL ENGINEERING (ME)

Semester II (First year)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		C	CIE	SEE
1	Basic Science courses	20ABS9906	Differential Equations and Vector Calculus	3	0	0	3	30	70	100
2	Basic Science course	20ABS9905	Engineering Chemistry	3	0	0	3	30	70	100
3	Humanities and Social science	20AHS9901	Communicative English	3	0	0	3	30	70	100
4	Engineering Science Courses	20AES0509	Basics of Python Programming	3	0	0	3	30	70	100
5	Engineering Science Courses	20AES0304	Engineering Workshop Practice	1	0	4	3	30	70	100
6	Humanities and Social science LAB	20AHS9902	Communicative English Lab	0	0	3	1.5	30	70	100
7	Basic Science course (LAB)	20ABS9910	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
8	Engineering Science Courses/Prof Core (Interdisciplinary) (LAB)	20AES0510	Basics of Python Programming Lab	0	0	3	1.5	30	70	100
	Mandatory course (AICTE suggested)	20AMC9902	Constitution of India	2	0	0	0	30	-	30
Total credits							19.5	270	560	830

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MECHANICAL ENGINEERING (ME)

Year: I

Semester : II

Branch of Study : CE & ME

Subject Code	Subject Name	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, method of variation of parameters.

UNIT II

Equations Reducible to Linear Differential Equations and Applications: Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems

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

Multivariable Calculus (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

Multivariable Calculus (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).

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

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MECHANICAL ENGINEERING (ME)

Year: I

Semester : II

Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
20ABS9905	Engineering Chemistry	3	0	0	3

Course Outcomes:

1. Differentiate between hard water and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially
2. Understand the electrochemical sources of energy
3. Demonstrate the corrosion prevention methods and factors affecting corrosion
4. Explain the preparation, properties, and applications of thermoplastics & thermo settings, elastomers & conducting polymers.
5. Explain calorific values, octane number, refining of petroleum and cracking of oils
6. Explain the manufacturing of portland cement and concrete formation
7. Summarize the application of SEM, TEM and X-ray diffraction in surface characterization
8. Explain the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures

UNIT I

Water Technology: 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 electro dialysis.

UNIT II

Electrochemistry and applications: Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations. Primary cells – 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.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, environmental factors (pH, temperature, DO) affecting corrosion rate, Pourbaix diagrams for iron and aluminium, protection – corrosion inhibitors with specific examples, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT III

Polymers and Fuel Chemistry: 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.

Thermoplastics and Thermo-sets, Elastomers – applications with specific examples.

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

Fuels – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal, refining of petroleum, liquid fuels, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils; alternative fuels- propane, methanol and ethanol, bio fuels.

UNIT IV

Cement and Concrete Chemistry: Introduction to building materials – Portland cement, constituents, manufacturing process-raw materials for manufacturing process, reactions below 1300 °C and reactions between 1300 and 1450 °C, reactions during cooling, grinding or storage, chemical equations, phases of cement clinker (alite, belite, aluminat and ferrite), reactivity of clinker phases, parameters to characterize the clinker formation: lime saturation factor (LSF), silica ratio (SR) and alumina ration (AR), chemistry of setting and hardening of cement (hydration, hydrolysis, equations), scheme of concrete formation,

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admixtures for concrete improvement – retarders, accelerators, air-entraining agents, grinding agents, super plasticizers, dispersants, etc.

UNIT V

Surface Chemistry and Applications: Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, characterization of surface by physicochemical methods (SEM, TEM, X-ray diffraction), solid-gas interface, solid-liquid interface, adsorption isotherm, BET equation (no derivation), calculation of specific surface area of solids, numerical problems, functionalization of surface of nanomaterials– applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

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. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heinemann, 1992.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO1:Engineering knowledge	1.2	1.2.1
CO 2	PO1:Engineering knowledge	1.4	1.4.1
CO 3	PO1:Engineering knowledge	1.2	1.2.1
CO 4	PO1:Engineering knowledge	1.2	1.2.1
CO 5	PO2: Problem Analysis	2.4	2.4.4
CO 6	PO1:Engineering knowledge	1.4	1.4.1
CO 7	PO2: Problem Analysis	2.4	2.4.4
CO 8	PO2: Problem Analysis	2.4	2.4.4

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MECHANICAL ENGINEERING (ME)

B.Tech I-Year

Semester : II

Branch : Common to all

Subject Code: 20AHS9901	Communicative English	L 2	T 0	P 0	Credits:2
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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 uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Unit 2: ON CAMPUS**10 Hours (4L+6P)**

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

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

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

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

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

Unit 3: THE FUTURE OF WORK**10 Hours (4L+6P)**

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

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

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

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

Unit 4: FABRIC OF CHANGE**8 Hours (2L+6P)**

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

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

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

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

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

Unit 5: TOOLS FOR LIFE

8 Hours (2L+6P)

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

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

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

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

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

Suggested books:

Text 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

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CO2.	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.1	10.1.1
CO3.	PO9-Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	9.2	9.2.1
CO4.	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.1	10.1.1
CO5	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.3	10.3.1
CO6.	PO10-Able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	10.2	10.2.1

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MECHANICAL ENGINEERING (ME)

B.Tech I-Year

Semester : II

Branch : Common to all

Subject Code: 20AES0509	Subject Name: Basics of Python Programming	L 3	T 0	P 0	Credits:3
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Course Objectives

After successful completion of the course, students will be able to:

CO1. Demonstrate knowledge on Python constructs to solve basic problems.

CO2. Develop and use Python modules to provide solutions to problems.

UNIT-I: INTRODUCTION TO PROBLEM SOLVING AND PYTHON PROGRAMMING

Problem Solving Aspect: top-down design, implementation of algorithms, building blocks of flow charts, program verification and efficiency of algorithms.

Python Programming: tokens, literals, identifiers, keywords, special symbols and operators; fundamental data types, expressions, type conversions, handling Input and output in Python.

UNIT-II: CONTROL STRUCTURES

Selection Statements: if statement, if-else statement, if-elif-else statement, nested-if statement.

Iterative Statements: while loop, for loop, break statement, continue statement, pass and else statements used with loops.

UNIT-III: SEQUENCES, SETS, DICTIONARIES AND DATA STRUCTURES

Sequences: Lists and operations - creating, inserting elements, updating elements, deleting elements, searching and sorting, list comprehensions, nested lists; tuples - creating, searching and sorting, nested tuples; strings - Initializing a string and string operations, string handling methods, string formatting; sets - set creation and operations; dictionaries - operations on dictionaries, dictionary methods, sorting elements using lambdas.

UNIT-IV: MODULAR PROGRAMMING AND FILE HANDLING

Modular Programming: need for functions, function definition, function call, variable scope and lifetime, return statement, positional arguments, keyword arguments, default arguments and variable-length arguments, recursive functions; Modules - math, NumPy, date and time.

File Handling: types of files, opening and closing files, reading and writing data.

UNIT-V: DATA REPRESENTATION AND VISUALIZATION

Pandas: creating data frame, reading data from CSV files, indexing and selecting data, dealing with rows and columns;

Visualization - bar plots, histogram, Scatter Plot.

TEXT BOOKS:

1. R. Nageswara Rao, *Core Python Programming*, 2nd edition, Dreamtech Press, 2018.
2. R. G. Dromey, *How to solve it by Computer*, Pearson, 2006.

REFERENCE BOOKS:

1. Reema Thareja, *Python Programming using Problem Solving Approach*, 1st edition, Oxford University Press, 2017.
2. Charles Dierbach, *Introduction to Computer Science using Python: A Computational Problem-Solving Focus*, Wiley India, 2016.

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MECHANICAL ENGINEERING (ME)

Year : I

Semester : II

Branch of Study : CE, ECE, ME, EEE

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

- Half – Lap joint
- Mortise and Tenon joint
- 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

- Tapered tray
- Conical funnel
- Elbow pipe
- 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

- V-fit
- Dovetail fit
- Semi-circular fit
- 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.

- Parallel and series
- Two-way switch
- Godown lighting
- Tube light
- Three phase motor
- Soldering of wires

List of COs	öPO 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

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CO: 4	PO 3: Design/Development of Solutions	3.2	3.2.2
CO: 5	PO 2: Problem analysis	2.3	2.3.2

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MECHANICAL ENGINEERING (ME)

B. Tech I-Year

Semester: II

Branch : Common to all

Subject Code: 20AHS9902	Subject Name: Communicative English Lab	L T P 0 0 2	Credits:1.5
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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. Group Discussions
3. Oral Presentations – Power Point Presentations and Poster Presentations

Unit 3

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

Unit 4

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

Unit 5

1. Vocabulary Building
2. Debates

Software Source:

K-Van Solutions Software

Reference:

Teaching English - British Council

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Year: I

Semester : II

Branch of Study : ME

Subject Code	Subject Name	L	T	P	Credits
20ABS9910	Engineering Chemistry Lab	0	0	3	1.5

Course Outcomes:

1. Determine the cell constant and conductance of solutions
2. Prepare advanced polymer materials
3. Determine the physical properties like surface tension, adsorption and viscosity
4. Estimate the Iron and Calcium in cement
5. Calculate the hardness of water

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of a polymer
7. Determination of viscosity of polymer solution using survismeter
8. Determination of percentage of Iron in Cement sample by colorimetry
9. Estimation of Calcium in port land Cement
10. Preparation of nanomaterials
11. Adsorption of acetic acid by charcoal
12. Determination of percentage Moisture content in a coal sample

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

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Year: I

Semester : II

Branch of Study : ME

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

COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- CO1. Develop scripts using Scratch tool to simulate simple problems.
 CO2. Apply Python Constructs and Modules to develop solutions for real-life problems.
 CO3. Function effectively as an individual and in team to foster knowledge and creativity.
 CO4. Write and present a substantial technical report/ document effectively.

PRACTICAL EXERCISES:

- 1)
 - a) Design a script in Scratch to simulate Airplane for take-off and land.
 - b) 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.
- 2)
 - a) Design a script in Scratch to calculate factorial of a given number.
 - b) Design a script in Scratch to simulate Maze game. (Hint: To get Maze images refer <http://inventwithScratch.com/downloads/>)
- 3)
 - a) Write a python script to read two integer numbers and perform arithmetic operations.
 - b) Write a python script to evaluate following expressions by considering necessary inputs.
 - i) $ax^2 + bx + c$ ii) $ax^5 + bx^3 + c$ iii) $(ax + b) / (ax - b)$ iv) $x - a / b + c$
- 4)
 - a) Write a python script to convert given decimal number into octal, hexa decimal and binary.
 - b) Write a python script to read four integer values separated with commas and display the sum of those four numbers.
 - c) Write a python script to print "SVEC" with prefix of ten spaces by using format().
- 5)
 - a) Write a python script to calculate electricity bill based on following slab rates.

<u>Consumption units</u>	<u>Rate (in Rupees/Unit)</u>
0-100	4
101-150	4.6
151-200	5.2
201-300	6.3
Above 300	8

(Hint: To get Consumption units take current Meter reading, old meter reading from the user as input)

- b) Print the following pattern using python script.

```

1
  1  2  1
    1  2  3  2  1
      1  2  3  4  3  2  1
        1  2  3  4  5  4  3  2  1
  
```

- 6)
 - a) Write a python script to read N student details like name, roll number, branch and age. Sort the student details based on their names and display.
 - b) Write a python script to delete duplicate strings from a list of strings. (Insertion order should

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maintain after deleting duplicate string).

- c) Write a python script to read N number of student details into nested list and convert that as a nested dictionary.
- 7) a) Design a function that can perform sum of two or three or four numbers.
 b) Write a python script to implement towers of Hanoi problem.
 c) Write a Python function primesquare(l) that takes a nonempty list of integers and returns True if the elements of l alternate between perfect squares and prime numbers, and returns False otherwise. Note that the alternating sequence of squares and primes may begin with a square or with a prime. Here are some examples to show how your function should work.
- ```
>>>primesquare([4])True
>>>primesquare([4,5,16,101,64])True
>>>primesquare([5,16,101,36,27]) False
```
- 8) a) Write a python script to perform arithmetic operations on numpyarrays.  
 b) Write a python script to perform following matrix operations using numpy.  
 i)Dot product ii) Matrix product iii) Determinant iv) Inverse
- 9) a) Write a python script to Create Pandas dataframe using list of lists.  
 b) Write a python script to load data from a CSV file into a Pandas DataFrame and perform basic operations on it.
- 10) a) Draw a Scatter Plot by considering an appropriate data set.  
 b) Draw histograms by considering an appropriate data set.

**TEXT BOOK:**

1. R. Nageswara Rao, *Core Python Programming*, 2<sup>nd</sup> edition, Dreamtech Press, 2018.

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Year: I

Semester: II

Branch of Study : ME

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

**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****4hrs**

History of Making of the Indian Constitution - History Drafting Committee, (Composition &amp; Working)

**Unit:2****8hrs**

Philosophy of the Indian Constitution - Preamble Salient Features

**Unit:3****8hrs**

Contours of Constitutional Rights &amp; 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.

## 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)

## MECHANICAL ENGINEERING (ME)

| 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                 |