1.2.1(2) _CE_ Extract from Syllabus (2017-18 to 2021-22)

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI

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

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

Course Outcomes:

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

Unit I : Mechanics

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

Unit II : Crystallography And Ultrasonics

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

Unit III: Dielectric and Magnetic Materials

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

Unit IV: Lasers and Fiber Optics

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

Unit V: Nanomaterials

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

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Year : I	Semester : I	Branch of Study : Common to ME & CE			
Subject Code:19ABS9908	Subject Name: **Engineering Physics Lab**	L 0	T 0	P 3	Credits:1.5

Course Outcomes:

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

List of Experiments

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

References:

1. S. Balasubramanian, M.N.Srinivasan, "A Text book of Practical Physics"-S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php-VirtualLabs, Amrita University.

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

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

Course Outcomes:

1. Develop the use of matrix algebra techniques that is needed by engineers for practical applications
2. Utilize mean value theorems to real life problems
3. Familiarize with functions of several variables which is useful in optimization
4. Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
5. Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

Unit I : Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit II : Mean Value Theorems

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

Unit III: Multivariable calculus

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

Unit IV: Double Integrals

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

Unit V: Multiple Integrals and Special Functions

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

Textbooks:

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

References:

1. Dr.T.K.V Iyengar, B.Krishna Gandhi, S. Ranganatham amd M.V.S.S.N Prasad, Mathematics – 1, S.Chand publications.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.

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

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

1. **Identify the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English**

2. **Formulate sentences using proper grammatical structures and correct word forms**

3. **Speak clearly on a specific topic using suitable discourse markers in informal discussions.**

4. **Write summaries based on global comprehension of reading / listening texts.**

5. **Produce a coherent paragraph interpreting a figure/graph/chart/table.**

Unit 1 : Technology With a Human Face - Schumacher

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests;

introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countables and uncountables; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Unit 2:   I have three vision for India: **Presidential Speech by Abdul Kalam**

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

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

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

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

Year I　　　　　Semester I　　　　　Branch of Study: Common to All

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

Course Outcomes:

CO1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills

CO2: Apply communication skills through various language learning activities.

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.

CO4: Evaluate and exhibit acceptable etiquette essential in social and professional settings.

CO5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

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

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

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

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

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

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

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

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

Course outcomes: Student should be able to

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

Unit – 1: Visual Programming through Scratch and App Inventor

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

Unit – 2: Flowchart design through Raptor

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

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

Unit – 3 : Introduction to Python

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

Unit – 4 : Data Structures and Idiomatic Programming in Python

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

Unit – 5 : Event driven Programming

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

Text Book:

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

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

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

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

1. Design a script in Scratch to make a sprite to draw geometrical shapes such as Circle, Triangle, Square, and Pentagon.
2. Design a script in Scratch to make a sprite to ask the user to enter two different numbers and an arithmetic operator and then calculate and display the result.
3. Design a Memory Game in Scratch which allows the user to identify positions of similar objects in a 3 x 3 matrix.
4. Construct flowcharts to
a. calculate the maximum, minimum and average of N numbers
b. develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
5. Construct flowcharts with separate procedures to
a. calculate simple and compound interest for various parameters specified by the user
b. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
6. Construct flowcharts with procedures to
a. generate first N numbers in the Fibonacci series
b. generate N Prime numbers
7. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
8. Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
9. Design a flowchart to determine the number of characters and lines in a text file specified by the user
10. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
11. Design a Python script to determine if a given string is a Palindrome using recursion
12. Design a Python script to sort numbers specified in a text file using lists.
13. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.

14. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.

15. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)

16. Design a Python Script to find the value of (Sine, Cosine, Log, PI, e) of a given number using infinite series of the function.

17. Design a Python Script to convert a given number to words

18. Design a Python Script to convert a given number to roman number.

19. Design a Python Script to generate the frequency count of words in a text file.

20. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.

21. Design a Python Script to implement Gaussian Elimination method.

22. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.

23. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

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

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Year : I B.Tech   **Semester: II Sem**   **Branch of Study: ME & CE**

Subject Code 19ABS9906	Subject Name: **Differential Equations and Vector Calculus**	L 3	T 0	P 0	Credits: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 and Reference 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 andManish Goyal, A text book of Engineering Mathematics,Laxmi publication,2008

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Year: I   **Semester:** II   **Branch of Study: CE,ME & CSE**

Subject Code	Subject Name	L	T	P	Credits
19AES0202	Basics of Electrical &Electronics Engineering-I	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.

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

Subject Code:19ABS9905	Subject Name: Engineering chemistry	L T P 3 0 0	Credits: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 & thermosettings, 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 1: 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 electrodialysis.

Unit 2: 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 3: 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 4: 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, aluminate 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, admixtures for concrete improvement – retarders, accelerators, air-entraining agents, grinding agents, super plasticizers, dispersants, etc.

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Year I	Semester II	Branch of Study: ME & CE

Subject Code 19ABS9910	Subject Name ENGINEERING CHEMISTRY LAB	L 0	T 0	P 3	Credits: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

List of COs	PO no. and keyword	Competency	Performance Indicator
CO 1	PO 4: Conduct Investigations of complex problems	4.3	4.3.3
CO 2	PO 4: Conduct Investigations of complex problems	4.3	4.3.1
CO 3	PO 4: Conduct Investigations of complex problems	4.3	4.3.1
CO 4	PO 4: Conduct Investigations of complex problems	4.3	4.3.2
CO 5	PO 4: Conduct Investigations of complex problems	4.3	4.3.2

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Year : I	Semester : II	Branch of Study : Common to All		
19AES0502	Data Structures	L T P 3 1 0	Credits: 3	

Course Outcomes:
1. Understand the importance of AI and concepts of Machine Learning algorithms and their limitations.
2. Develop Chatbots based on the requirements.
3. Analyse complex problems involving image processing, such as quality control, visual surveillance, multimodal human-machine interfaces, and image compression.
4. Understand the application of Reinforcement Learning
5. Understand smart solutions for various domains

Unit I: Introduction to Artificial Intelligence
Basics of AI. Applications of AI. Advanced search, Constraint satisfaction problems, Knowledge representation & reasoning, Non-standard logics, Uncertain and probabilistic reasoning Conceptual introduction to **Machine Learning:** Introduction to Neural Networks, Supervised, Unsupervised, and Semi-Supervised Learning, Deep Learning, Reinforcement Learning, Linear Regression. Conceptual introduction to **Natural Language Processing:** Natural language Understanding, Sentiment Analysis, Segmentation and recognition. Conceptual introduction to **Speech Recognition & Synthesis:** Speech Fundamentals, Speech Analysis, Speech Modeling, Speech Recognition, Speech Synthesis, Text-to-Speech Conceptual introduction to **Image Processing & Computer Vision:** Introduction to Image processing, Image Noise, Removal of Noise from Images, Color Enhancement,Segmentation, Edge Detection, Optical Character Recognition, Feature Detection & Recognition

Unit II: BOT Technologies and Virtual Assistants:
Chatbots: Introduction to a Chatbot, Architecture of a Chatbot. NLP in the cloud, NL Interface, How to Build a Chatbot, Transformative user experience of chatbots, Designing elements of a chatbot, Best practices for chatbot development. NLP components. NLP wrapper to chatbots. Audiobots and Musicbots.
Virtual Assistants: Architecture of a Virtual Assistant.

Unit III: Image Processing & Computer Vision :
Image - Definition and Tagging. Classification of images. Tagging. Image formation, Deep Learning algorithms for Object detection & Recognition. Face recognition, Instance recognition, Feature detection and matching, Segmentation, Recognition Databases and test sets Applications -- Feature extraction, Shape identification. Fane detection,.
Applications: Automation, Agriculture[Crop and Soil Monitoring, Grading farm produce, Predictive Analytics], Retail and Retail Security[Amazon Go], Autonomous vehicles,

Unit IV: Reinforcement Learning
Introduction to Reinforcement Learning, Game Playing [Deep Blue in Chess, IBM Watson in Jeopardy, Google's DeepMind in AlphaGo], Agents and Environment, Action-Value Function, Deep Reinforced Learning
Applications : Robotics, Gaming, Diagnostic systems, Virtual Assistants

Unit V: Smart Applications
Smart Manufacturing, Smart Agriculture, Smart Healthcare, Smart Education, Smart Grids, Smart Transportation and Autonomous Vehicles, Smart Homes, Smart Cities.

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Textbooks:

1. Tom Markiewicz & Josh Zheng,Getting started with Artificial Intelligence,Published by O'Reilly Media,2017
2. Stuart J. Russell and Peter Norvig,Artificial Intelligence A Modern Approach

Reference Books:

1. Aurélien Géron,Hands on Machine Learning with Scikit-Learn and TensorFlow [Concepts, Tools, and Techniques to Build Intelligent Systems], Published by O'Reilly Media,2017
2. Build an AI Assistant with Wolfram Alpha and Wikipedia in Python. https://medium.com/@salisuwy/build-an-ai-assistant-with-wolfram-alpha-and-wikipedia-in-python-d9bc8ac838fe
3. Tom Markiewicz & Josh Zheng,Getting started with Artificial Intelligence,Published by O'Reilly Media,2017

Map POs with CIs and PIs:

Course Outcome	PO no and Keyword	Competency Indicator	Performance Indicator
CO1	PO1:Apply	1.1 1.4	1.1.1 1.1.2 1.1.4
CO2	PO1:Apply	1.1 1.4	1.1.1 1.1.2 1.1.4
CO3	PO2:Formulate	2.1	2.1.1 2.1.2 2.1.3
CO4	PO4:Research-based Knowledge	4.1	4.1.1 4.1.2 4.1.3
CO5	PO5:Create & Apply	5.1 5.3	5.1.1 5.1.2 5.3.1 5.3.2

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

19AES0 504	Data Structures Lab	L 2	T 1	P 0	Credits: 3

Course Outcomes:

1. Understand the importance of AI and concepts of Machine Learning algorithms and their limitations.
2. Develop Chat bots based on the requirements.
   3. Analyze complex problems involving image processing, such as quality control, visual surveillance, multimodal human-machine interfaces, and image compression.

Experiments:

1. Supervisely - Perform Data Labelling for various images using object recognition

Experiment Outcomes:

- Understand supervised learning for various datasets of images using Pattern Recognition.

2. Lobe.ai - Build custom models using the visual tool for Object recognition and sentiment analysis that can convert facial expressions into emoticons

Experiment Outcomes:

- Manage image databases using detection tools for classification.
- Build different applications using Image Processing & Computer Vision.

3. Teachable Machine - In Browser Object Recognition through Brain.JS

Experiment Outcomes:

- Understand Image Recognition through Brain.JS

4. Liv.ai - App for Speech recognition and Synthesis through APIs

Experiment Outcomes:

- Summarize applications of Speech Recognition and Synthesis.

5. Building a Chatbot using AWS Lex, Pandora bots

Experiment Outcomes:

- Develop bots, chatbots, audiobots, music bots

6. Configure an existing Neural Network by manipulating various parameters involved

Experiment Outcomes:

- Understand different Neural Networks by various parameters.

7. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python

Experiment Outcomes:

- Build an AI Assistant with Wolfram Alpha and Wikipedia in Python

8. Build a Convolutional Neural Network for Cat vs Dog Image Classification

Experiment Outcomes:

- Build CNN for different images Classification

References :
Pytorch: https://pytorch.org/

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Year: I   **Semester:** II   **Branch of Study:** CE,ME &CSE

Subject Code	Subject Name	L	T	P	Credits
19AES0204	**Basics of Electrical & Electronics Engineering Lab – I**	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 Kirchhoff 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).

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

Subject Code	Subject Name	L	T	P	Credits
19ALC0101	Civil Engineering Workshop	0	0	3	1.5

Course outcomes:

CO1: Able to determine Setting out of a building
CO2: Understand the concept of Construct a wall of height 50 cm
CO3: Determine the Computation of Centre of gravity and Moment of inertia
CO4: Determine the Plastering and Finishing of wall
CO5: Examine the Casting and testing of Fly ash Blocks

LABORATORY EXPERIMENTS

1) Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape only.

2) Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.

3) Computation of Centre of gravity and Moment of inertia of a given rolled steel section by actual measurements.

4) Installation of plumbing and fixtures like Tap, T-Joint, Elbow, Bend, Threading etc;

5) Plastering and Finishing of wall

6) Application of wall putty and painting a wall

7) Preparation of cement Fly ash Blocks and testing for compressive strength

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Year : II B.Tech   **Semester: I**   **Branch of Study: CE and ME**

SubjectCode:19ABS9913	Subject Name: Probability & Statistics, PDE, Complex Variables	L T P 3 0 0	Credits 3

Course Outcomes:

1) Apply discrete and continuous probability distributions
2) Design the components of a classical hypothesis test
3) Infer the statistical inferential methods based on small and large sampling tests
4) Find the general solution of the PDEs bearing applications
5) Differentiation and integration of complex functions used in engineering problems To equip the students to solve application problems in their disciplines.

Unit I: Probability

probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties.

Unit II: Testing of Hypothesis

Formulation of null hypothesis, critical regions, level of significance. Large sample tests: test for single proportion, difference of proportions, test for single mean and difference of means.

Unit III: Small Sample Tests

Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), χ^2 - test for goodness of fit.

Unit IV: Applications of Partial Differential Equations

Method of separation of variables, solution of 1D-wave, 1D-heat and 2D-Laplace's equation in Cartesian coordinates.

Unit V: Complex Variables

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate. Complex integration, Cauchy theorem (without proof), Cauchy integral formula (without proof), Taylor's series, zeros of analytic functions, singularities, Laurent's series, residues, Cauchy residue theorem (without proof).

Text Books:

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

References:

1. S.Chand ,Engineering Mathematics-II,III &IV by Dr.T.K.V.Iyengar, Dr.B.Krishna Gandhi, S.Ranganatham, Dr.M.V.S.S.N.Prasad
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9/e, Wiley India, 2009.

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

Subject Code: 19AHS9903	Subject Name: **Communicative English II**	L T P 2 0 0	Credits:2

Course Outcomes

At the end of the course, the learners will be able to
1. Prioritize information from reading texts after selecting relevant and useful points
2. Paraphrase short academic texts using suitable strategies and conventions
3. Make formal structured presentations on academic topics using PPT slides with relevant graphical elements
4. Participate in group discussions using appropriate conventions and language strategies
5. Prepare a CV with a cover letter to seek internship/ job
6. Collaborate with a partner to make presentations and Project Reports

Syllabus

Unit 1   (10 hrs)

Listening : Listening for presentation strategies and answering questions on the speaker, audience, and key points.
Speaking: Formal presentations using PPT slides without graphic elements.
Reading: Reading for presenting – strategies to select, compile and synthesize information for presentation; reading to recognize academic style.
Writing: Paraphrasing; using quotations in writing; using academic style - avoiding colloquial words and phrases.
Grammar and Vocabulary: Formal/academic words and phrases.

Unit 2   (10 hrs)

Listening: Following an argument/ logical flow of thought; answering questions on key concepts after listening to extended passages of spoken academic discourse.
Speaking: Formal presentations using PPT slides with graphic elements.
Reading: Understand formal and informal styles; recognize the difference between facts and opinions.
Writing: Formal letter writing and e-mail writing (enquiry, complaints, seeking permission, seeking internship); structure, conventions and etiquette.
Grammar and Vocabulary: Phrasal prepositions; phrasal verbs.

Unit 3   10(hrs)

Listening: Identifying views and opinions expressed by different speakers while listening to discussions.
Speaking: Group discussion on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position.
Reading: Identifying claims, evidences, views, opinions and stance/ position.

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

Subject Code	Subject Name	L	T	P	Credits
19APC0101	Mechanics of Materials	3	0	0	3

Course Outcomes:
1: Understand the system of forces on bodies.
2: Determine the centroid and moment of inertia for different cross-sections.
3: Understand the concepts of stress, strain, generalized Hooke's law, elastic modulii
4: Develop shear force and bending moment diagrams for different load cases.
5: Compute the slope and deflection of simple beams

UNIT - I

Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams and Equations of Equilibrium of Coplanar Systems, support reactions for simply supported beam.

UNIT - II

Centroid and Center of Gravity: Introduction – Centroids of rectangular, triangular, circular, I, L and T sections. **Area moment of Inertia**: Introduction – Definition of Moment of Inertia of rectangular, triangular, circular, I, L and T sections - Radius of gyration, perpendicular axis theorem and parallel axis theorem.

UNIT – III

Simple Stresses and Strains:

Types of stresses and strains – Hooke's law – Stress – strain diagram for mild steel – working stress – Factor of safety – lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of Varying section – Composite bars – Temperature stresses.

UNIT – IV

Shear Force and Bending Moment:

Definition of beam – types of beams – Concept of Shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and over changing beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – point of contra flexure – Relation between S.F, B.M and rate of loading at section of a beam.

UNIT – V

Deflection of Beams: Uniform bending – slope, deflection and radius of curvature - Determination of slope and deflection for cantilever and simply supported beams under point loads and U.D.L. -Mohr's theorems – Moment area method –Conjugate beam method.

TEXT BOOKS:
1. R.K Bansal, Engineering Mechanics, Lakshmi Publications.
2. R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd.
3. R. Subramanian, Strength of Materials, Oxford University Press.

REFERENCES:
1. S.S. Bhavakatti, Engineering Mechanics, New Age Publishers.

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Year: II		Semester: I				Branch of Study: CE

Subject Code	Subject Name	L	T	P	Credits
19AMC9901	Biology for Engineers	2	0	0	0

Course Outcomes:

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

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

3. Brief about human physiology.

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

5. Know about application of biological principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.

Unit I: Introduction to Basic Biology

Evolution: Different patterns of evolution, Darwin's theory of evolution, Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification, Tissue Engineering.

Unit II: Introduction to Biomolecules

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Unit III: Human Physiology

Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle, Central Nerves System and Excretory system.

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology

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

Unit V: Application of Biology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, Properties and Classification of virus, Immune response to virus, Definitions-Pandemic, Epidemic and outbreak, pandemic alert system ranges, Prevention of pandemic disease and pandemic preparation.

Text books:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications

2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

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Reference Books:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A Global Approach", Pearson Education Ltd, 2018.

2. T Johnson, Biology for Engineers, CRC press, 2011

3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.

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Subject Code	Subject Name	L	T	P	Credits
19APC0102	Surveying	4	0	0	4

Course Outcomes:

1: Understand basic principles of surveying, Prismatic compass
2: Understand basic concepts of leveling and contouring and Theodolite survey
3. Understand Computation of Areas and Volumes
4: Understand and able to set the curves on field.
5: Understand modern techniques in the survey systems.

UNIT – I:

Basics of Surveying: Definition, principles and classification of surveying - Principles of chain survey –Types of chains - Tape corrections – types of Ranging - Construction and working of prismatic compass – Types of bearing - Declination, local attraction.

UNIT – II:

Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method.
Contouring- Characteristics and uses of Contours - methods of contour surveying, interpolation and sketching of Contours.
Theodolite Surveying: Measurement of horizontal and vertical angles-reiteration and repetition methods.

UNIT – III:

Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary - Volume- trapezoidal and prismoidal formula-
Determination of volume of earth work in cutting and embankments.

UNIT – IV:

Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves-problems.
Construction surveys: Introduction-setting out of buildings-highways culverts.

UNIT – V:

Modern Field Survey Systems:
EDM and Total Station: Measurement principle of EDM - EDM instrument characteristics - Accuracy in EDM - Total station – Introduction – Advantages - Types and applications of total station - Field procedure.
Differential Global Positioning System (DGPS): Introduction - Working principle - DGPS receivers -Applications of DGPS. Surveying with LIDAR.

Text Books:

1. Arora, K.R. I, Surveying, Vol-I, II and II, Standard Book House, 2015.
2. C. Venkatramaiah, Text Book of Surveying, Universities Press Pvt Ltd, Hyderabad. Revised Edition 2011.
3. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying (Vol – 1,2 &3), by – Laxmi Publications (P) Ltd., New Delhi.
4. N.N. Basak, Surveying and Levelling- Tata McGraw-Hill Education, 2017.

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

Subject Code	Subject Name	L	T	P	Credits
19APC0106	Surveying Lab	0	0	4	2

Course Outcomes:

1: Understand basic principles of plane table surveying and fly leveling.

2: Understand basic concepts of theodolite survey and trigonometric leveling

3: Understand basic concepts of total station

4:Uunderstand the components of simple curve and able to set the curve on field.

5: Understand modern techniques in the survey systems.

LIST OF FIELD WORKS:

1. Chain Survey: Finding the area of a given boundary
2. Plane table survey: Finding the area of a given boundary
3. Compass Survey: Determining the Horizontal Angles and Area
4. Fly levelling: Height of the instrument method and rise and fall method.
5. Measurement of Horizontal and vertical angle by theodolite
6. Total Station: Determination of Remote height and distance.
7. Total Station: Determination of area.
8. Total Station: Preparation of contour maps for small area
9. Stake out using total station
10. Setting out of building using total station and curve setting

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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:

5) Apply the Laplace transform for solving differential equations (continuous systems)
6) Find the Fourier series of periodic signals
7) Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
8) Solve linear/nonlinear algebraic and transcendental equations using numerical methods
9) 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 II : Fourier series:

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

Unit III :Fourier transforms:

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

Unit IV: 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

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

Subject Code	Subject Name	L	T	P	Cre dits
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.

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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
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 $1/\pi$:

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
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

Multidisciplinary Nature of 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

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).

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Year: III **Semester:** I **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0115	Building Planning and Drawing	2	0	0	2

Course Outcomes: At the end of the course the student will able to

1. Understand the Principles of Building Planning
2. Understand the Building Bye–Laws and Regulations
3. Understand the Planning of Residential Buildings Public Buildings
4. Understand the Buildings Safety And Comfort
5. Understand the sign conventions and bonds doors and windows

UNIT – I

Principles of Building Planning: Types of buildings, types of residential buildings – site selection for residential building, orientation of buildings; aspect; prospect grouping, circulation, privacy, economy, flexibility and practical considerations.

UNIT – II

Building Bye–Laws and Regulations: Introduction – Objectives of building bye-laws – Principles underlying building bye-laws – Terminology – Floor area ratio (FAR), Floor space index (FSI) – Classification of buildings – Open space requirements – Built up area limitations – Height of the buildings – Wall thickness – Lighting and ventilation requirements.

UNIT – III

Planning of Residential Buildings: Introduction – Minimum standards for various parts of the buildings – Requirements of different rooms and their grouping – Veranda – Drawing room – Bed room – Kitchen – Dining room– Bath room

Public Buildings: Planning of Educational institutions, hospitals, Office buildings.

UNIT – IV

Buildings Safety And Comfort: Aspects of safety-structural, fire and constructional safety. Components of building automation system =fire-fighting, communication etc. design for thermal comfort, ventilation comfort, lighting comfort,

UNIT – V

SIGN CONVENTIONS AND BONDS: Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys, lead, zinc, tin,, earth, rock, timber and marble . English bond & Flemish bond; odd & even courses for one, one and half

DOORS AND WINDOWS: Paneled Door – paneled and glazed door; glazed windows – paneled windows;

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TEXT BOOKS:

1. Planning and Designing and Scheduling – Gurucharan singh and Jagadish singh- Standard publishers.

2. Building planning and design – N.Kumara swamy and A.Kameswara rao. Charitor publications.

REFERENCE BOOKS:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code

2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill.

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Year: III   **Semester: I**   **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Cre dits
19AOE0301	Sensor Networks	2	0	0	2

Course Outcomes:

Students will be able to

CO1. Understand the concepts of Converters and Sensor data acquisition systems

CO2: Understand the concepts of Sensor Measurements in Structural Monitoring

CO3: Understand the concepts of commonly used sensing technologies and algorithms

CO4: Understand the concepts of Piezoelectric transducers for assessing and monitoring infrastructures

CO5: Understand the concepts of Fiber optic sensors for assessing and monitoring infrastructures.

Unit-1 Sensor data acquisition systems and architectures

Introduction, General measurement system, Analog-to-digital converter architectures-Different types of ADCs – parallel comparator type ADC, Counter type ADC, successive approximation ADC and dual slope ADC Digital-to-Analog conversion-Basic DAC techniques, Weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Data acquisition systems-Analog Systems-Digital Systems

Unit-II Sensors and Sensing Technology for Structural Monitoring

Introduction, Sensor Types, Sensor Measurements in Structural Monitoring- Structural Responses-Environmental Quantities- Operational Quantities- Typical Quantities for Bridge Monitoring- Fibre Optic Sensors- Classification of Fibre Optic Sensors- Typical Fibre Optic Sensors in SHM- Fibre Optic Sensors for Structural Monitoring- Wireless Sensors- Components of Wireless Sensors- Field Deployment in Civil Infrastructure-Case Study

Unit-III Commonly used sensors for civil infrastructures and their associated algorithms

Introduction, commonly used sensing technologies- Displacement-Strain-Acceleration-Environment-Prevalence of commonly used sensors in SHM systems- Associated algorithms- Displacement sensors-Strain gages- Accelerometers- Environmental measurements- Examples of continuous monitoring systems

Unit-IV Piezoelectric transducers for assessing and monitoring civil infrastructures

Introduction, Principle of piezoelectricity, Piezoelectric materials and the fabrication of piezoelectric transducers, Piezoelectric transducers for SHM applications, Bonding effects, Limitations of piezoelectric transducers, SHM techniques using piezoelectric transducers

Unit-V Fiber optic sensors for assessing and monitoring civil infrastructures

Introduction, Optical fiber concepts, Sensing mechanisms, Sensor packaging, Cables, connectors, and splicing, Common optical fiber sensors- Coherent interferometers, Low-coherence interferometers, Fiber Bragg gratings, Brillouin and Raman scattering distributed sensors

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Text Books:

1. "Sensor Technologies for Civil Infrastructures", Volume 1 Sensing Hardware and Data Collection Methods for Performance Assessment Woodhead Publishing in Civil and Structural Engineering
     Ming L. Wang Jerome P. Lynch Hardcover ISBN: 9780857094322

2. "Wireless Sensor Networks for Civil Infrastructure Monitoring: A Best Practice Guide" ICE Publishing David Rodenas-Herráiz, Kenichi Soga, Paul R A Fidler and Nicholas de Battista

References:

1. Ghatak A and Thyagarajan K. (1998) Introduction to Fiber Optics; Cambridge University Press: Cambridge, UK.

2. Barthorpe, R.J. and Worden, K. (2009) Sensor Placement Optimization. Encyclopaedia of Structural Health Monitoring, Boller, Chang and Fujino (ed.), John Wiley & Sons, Chichester, UK.

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Year: III   **Semester: I**   **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APC0118	Computer- aided Civil Engineering Drawing Lab	0	0	3	1.5

Course Outcomes: After the completion of the course student should be able to
1. Understand the concepts and basics of CAD
2. Understand the building plan elevation and section drawings
3. Understand the building components drawings

LIST OF THE EXPERIMENTS

1. Introduction to computer aided drafting and Practice exercises on CAD Commands

2. Drawing of plans for Single storey buildings

3. Drawing of plans for Multi storey buildings

4. Development of sections and elevations for Single storey buildings

5. Development of sections and elevations for Multi storey buildings

6. Detailing of building components like doors, windows

7. Development of building components roof trusses

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

Subject Code	Subject Name	L	T	P	Credits
19APC0122	Remote Sensing and GIS	3	0	0	3

Course Outcomes: After the completion of the course student should be able to
1. Understand principles of aerial photography
2. Understand the concept of remote sensing
3. Understand the concept of GIS
4. Analyze the GIS spatial data
5. Apply the concepts of GIS in water resources

UNIT – I
INTRODUCTION TO PHOTOGRAMMETRY:

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II
REMOTE SENSING :

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III
GEOGRAPHIC INFORMATION SYSTEM:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

TYPES OF DATA REPRESENTATION:

Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV
GIS SPATIAL ANALYSIS:

Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V
WATER RESOURCES APPLICATIONS:

Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.

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

Subject Code	Subject Name	L	T	P	Credits
19APC0123	Remote Sensing and GIS Lab	0	0	3	1.5

Course Outcomes: After the completion of the course student should be able to
1. To understand spatial technologies, mapping the field problems and solution convergence through GIS.

LIST OF THE EXPERIMENTS

1. Development of georeferencing of maps either from cadastral or AutoCAD based map.
2. Identification of best locations of ground control points and mosaicing the different sources of maps of information like topo sheets & satellite data and other drawings.
3. Digitization and GIS coordination
4. GIS interface and features using open Source Software QGIS.
5. Case example on mapping like water distinguish, Road alignment road network etc.,

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI

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

Subject Code 19AMC9902	Subject Name CONSTITUTION OF INDIA	L 2	T 0	P 0	Credits: 2

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.

Unit:1

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

Unit:2

Philosophy of the Indian Constitution - Preamble Salient Features

Unit:3

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

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

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.

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PG
Year: I   **Semester: I**

AK19 Regulations
Branch of Study: CE

Subject Code	Subject Name	L	T	P	Credits
19DPC0102	Advanced Solid Mechanics	3	0	0	3

Course Outcomes: At the end of the course, students will be able to
1. Understanding the basic concepts, Cartesian Tensors and Equations of Elasticity.
2. Apply numerical methods to solve continuum problems.
3. Solve simple problems of elasticity and plasticity understanding the basic concepts.
4. Solve simple problems Two-Dimensional Problems of Elasticity and torsion
5. Understand Plastic Stress-Strain Relations, Principle of Normality and Plastic Potential

UNIT – I:

Introduction to Elasticity: Displacement, Strain and Stress Fields, Constitutive Relations, Cartesian Tensors and Equations of Elasticity.

UNIT – II:

Strain and Stress Field: Elementary Concept of Strain, Stain at a Point, Principal Strains and Principal Axes, Compatibility Conditions, Stress at a Point, Stress Components on an Arbitrary Plane, Differential Equations of Equilibrium, Hydrostatic and Deviatoric Components.

UNIT – III:

Equations of Elasticity: Equations of Equilibrium, Stress- Strain relations, Strain Displacement

And Compatibility Relations, Boundary Value Problems, Co-axiality of the Principal Directions.

UNIT – IV:

Two-Dimensional Problems of Elasticity: Plane Stress and Plane Strain Problems, Airy's stress Function, Two-Dimensional Problems in Polar Coordinates. **Torsion of Prismatic Bars:** Saint Venant's Method, Prandtl's Membrane Analogy, Torsion of Rectangular Bar, Torsion of Thin Tubes.

UNIT -V:

Plastic Deformation: Strain Hardening, Idealized Stress- Strain curve, Yield Criteria, von Mises Yield Criterion, Tresca Yield Criterion, Plastic Stress-Strain Relations, Principle of Normality and Plastic Potential, Isotropic Hardening.

REFERENCES:
1. Theory of Elasticity, Timoshenko S. and GoodierJ. N., McGraw Hill, 1961.
2. Elasticity, SaddM.H.,Elsevier,2005.
3. Engineering Solid Mechanics, RagabA.R., BayoumiS.E., CRC Press,1999.
4. Computational Elasticity, AmeenM., Narosa,2005.
5. Solid Mechanics, KazimiS. M. A., Tata McGraw Hill,1994.
6. Advanced Mechanics of Solids, SrinathL.S., Tata McGraw Hill,2000.

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PG   **AK19 Regulations**

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

Subject Code	Subject Name	L	T	P	Credits
19DPE0102	Advanced Concrete Materials and 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. Perceive special concretes for accomplishing performance levels.
5. Understand the durability of concrete and remedial methods.

UNIT – I:

Introduction to concrete – Mineral and chemical admixtures – Structure of hydrated cement paste – Calcium Aluminate Cement – Cement Production quality control - Transition zone in concrete – measurement of workability by quantitative empirical methods – concrete properties: setting and hardening.

UNIT – II:

Durability of concrete and concrete construction: Durability concept, pore structure and transport processes, Permeability of concrete, reinforcement corrosion, fire resistance, frost damage, sulphate attack, Acid attack, alkali silica reaction, delayed ettringite formation, methods of providing durable concrete, short-term tests to assess long-term behavior.

UNIT – III:

Mix design: Review of methods and philosophies of IS, BS and ACI methods, mix design for special purposes, Acceptance criteria for compressive strength of concrete.

Test methods: Analysis of fresh concrete, accelerated testing methods, Tests on hardened concrete, Core cutting and testing, partially destructive testing, Non-destructive testing of concrete structures.

UNIT – IV:

Special concretes: Lightweight concrete, autoclaved aerated concrete, no-fines concrete, lightweight aggregate concrete and foamed concrete, High strength concrete, high density and radiation-shielding concrete, polymer concrete, fibre-reinforced concrete, Ferro Cement.

UNIT – V:

Special concretes: Self Compacting Concrete, underwater concrete, grouts, grouting and grouted concrete, mass concrete, slip form construction, pumped concrete andGeopolymer concrete .

Text Book

1. Properties of Concrete, A.M.Neville, Longman 1995.
2. Concrete Technology Theory and Practice, M.S.Shetty, S.Chand& Company Ltd, New Delhi.

Reference

1. Concrete micro-structure, Properties and Materials, P.K.Mehta, J.M.Monteiro, Printice Hall INC & McGraw Hill, USA.

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Subject Code	Subject Name	L	T	P	Credits
19DPE0105	ENERGY EFFICIENT BUILDINGS	3	0	0	3

Course Outcomes:

1. This course aims to provide an understanding of the concept of reduction in energyconsumption through low energy building design.

2. Highlight strategies to integrate day lighting and low energy heating/cooling in buildings.

3. Understand the concept and theoretical background of low energy building design.

4. Apply simulation tools to achieve energy efficiency in buildings.

5. Understand importance of energy consumption.

UNIT – I

Green Buildings, Energy and Environment: Green Buildings within the Indian Context, Types of Energy, Energy Efficiency and Rebound Effect, Pollution, Better Buildings, Reducing energy consumption, Low energy design.

Renewable Energy sources : Solar energy, Passive Solar Heating, Passive Solar collection, Wind and other renewables. A passive solar strategy: Direct gain - Trombe wall, convective air loop, Photovoltaic's, Climate and Energy, Macro and Microclimate - Indian Examples.

UNIT – II

Heating and Cooling : Building Form Surface area and Fabric Heat Loss, utilizing natural energy, Internal Planning, Grouping of buildings – Robin's Spatial Proportion – Orientation of building –Heat transmission through buildings –Thermal properties of building materials – Thermal Comfort –Psychometric Chart –Heat transfer – Cosine Effect

- Insulation - Cooling buildings, passive cooling, and mechanical cooling – Measurement of heating and cooling loads.

Ventilation and Infiltration : Natural ventilation and forced ventilation in commercial buildings, passive cooling, modelling air flow and ventilation – stack effect - ventilation calculation – Mass effect.

UNIT -III

Day lighting and Artificial Lighting : Illumination requirements - Concepts of daylight factors and day lighting, daylight assessment, sky dome - sun path diagram, sky exposure angle, sun protection, shading coefficient, visualising day lighting: Source-Path-Target and apparent size, illuminance calculation, penetration and spread of sky component, artificial lighting, efficacy, Radiant barriers - new light sources – luminaries - light shelves - Supplementary artificial lighting design – light distribution – electric lighting control.

UNIT -IV

Design for Climatic Zones: Energy efficient building strategies for various climatic zones – cold and cloudy – cold and sunny – composite – warm and humid – moderate – hot and dry – case studies.

UNIT -V

Energy Assessment and Compliances Procedures : Energy awareness, monitoring energy consumption, Building Environmental Assessment- environmental criteria – embodied energy of building materials - assessment methods - assessment tools (e.g. GRIHA, LEED) - Ecohomes - Sustainable architecture and urban design – principles of environmental architecture.

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REFERENCES:

1. SatyajitGhosh and Abhinav Dhaka (2015), Green Structures: Energy Efficient Buildings, Ane Books.

2. Charles Eley (2016), Design Professional's Guide to Zero Net Energy Buildings, Island Press.

3. Ian M. Shapiro (2016), Energy Audits and Improvements for Commercial Buildings, John Wiley & Sons.

4. MoncefKrarti (2016), Energy Audit of Building Systems: An Engineering Approach, Second Edition.

5. EngHwa Yap., (2017), Energy Efficient Building., Published by InTech.,Crotia.LalJayamaha (2006), Energy-Efficient Building Systems: Green Strategies for Operation and Maintenance, McGraw Hill Professional.

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

Subject Code	Subject Name	L	T	P	Credits
19DMC9901	English for Research Paper Writing	2	0	0	0

❖ Course Outcomes: At the end of the course, students will be able to
  - o Understand that how to improve your writing skills and level of readability
  - o Learn about what to write in each section
  - o Understand the skills needed when writing a Title
  - o Develop writing skill
  - o Able to quote phrases

UNIT – I

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT – II

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

UNIT – III

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check. Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

UNIT – IV

Skill needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT –V

Useful phrases, how to ensure paper is as good as it could possibly be the first- timesubmission

REFERENCES:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York DordrechtHeidelberg London, 2011

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Subject Code	Subject Name	L	T	P	Credits
19DPC0103	Structural Design Lab-I	0	0	2	2

Course Outcomes: At the end of the course, students will be able to
1. Design and Detail of simple beams
2. Design and Detail of simple frames and Truss
3. Design and Detail complete all the Structural Components of Frame Buildings.
4. Design and Detail complete Multi-Storey Frame Buildings.
5. Analyze a Tall building for wind force

List of Experiments/Assignments: Design of Structures Using software
    1. Analysis of Cantilever, Simply Supported Beam, Fixed Beams, Continuous Beams for Different Loading Conditions.
    2. Analysis and design of plane and space frame
    3. Analysis and Design of plane and space truss
    4. Analysis, design and detailing of a multistoried building and Preparation of detailed drawings of different structural elements
    5. Wind analysis on tall structure
    6. Analysis and Design of steel transmission line tower

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES, TIRUPATI

PG
Year: I   **Semester : II**

AK19 Regulations
Branch of Study: CE

Subject Code	Subject Name	L	T	P	Credits
19DPC2005	FEM in Structural Engineering	3	0	0	3

Course Outcomes:
1: Analyze finite element method efficiently in order to solve field problems
2: Understand the basic concepts of 1D Dimensional elements
3: Understand the basic concepts of 2D Dimensional elements
4: Analyze 4-Noded And 8-Noded Isoparametric elements
5: Understand the concepts of 3-D Elements

UNIT – I

Introduction-Concepts Of FEM –Steps Involved –Merits &Demerits –Energy Principles –Discretization –Rayleigh –Ritz Method Of Functional Approximation.
Elastic Formulations: Stress Equations-Strain Displacement Relationships in Matrix Form-Plane Stress, Plane Strain AndAxi-Symmetric Bodies Of Revolution With Axi Symmetric Loading

UNIT – II

One Dimensional FEM-Stiffness Matrix For Beam And Bar Elements Shape Functions For ID Elements –Static Condensation Of Global Stiffness Matrix- Solution –Initial Strain And Temperature Effects- Numerical Integration Techniques.

UNIT – III

Two Dimensional FEM-Different Types of Elements For Plane Stress And Plane Strain Analysis –Displacement Models –Generalized Coordinates-Shape Functions-Convergent And Compatibility Requirements –Geometric Invariance – Natural Coordinate System-Area And Volume Coordinates-Generation Of Element Stiffness And Nodal Load Matrices –Static Condensation.

UNIT – IV

Isoparametric Formulation-Concept, Different Isoparametric Elements For 2D Analysis-Formulation Of 4-Noded And 8-Noded Isoparametric Quadrilateral Elements –Lagrangian Elements-Serendipity Elements.
Axi Symmetric Modelling –Strain Displacement Relationship-Formulation OfAxi Symmetric Elements.

UNIT -V

Three Dimensional FEM: Different 3-D Elements, 3D Strain –Displacement Relationship-Formulation of Hexahedral And Isoparametric Solid Element.

REFERENCES:

1. Finite Element Analysis, Seshu P., Prentice-Hall of India, 2005.
1. A First course in Finite element method by Daryl Logan, Third edition, Thomson Asia publishers, 2002.
2. Finite element analysis by S.S.Bhavikatti, Third edition, New Age International Publishers, 2015.
3. Concepts and Applications of Finite Element Analysis, Cook R. D., Wiley J., New York, 1995.
4. Fundamentals of Finite Element Analysis, Hutton David, Mc-Graw Hill, 2004.
5. Finite Element Analysis, Buchanan G.R., McGraw Hill Publications, New York, 1995.

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

Subject Code	Subject Name	L	T	P	Credits
19DPC2010	Design of Pre-stressed Concrete Structures	3	0	0	3

Course Outcomes:

1: Understand the basic aspects of prestressed concrete fundamentals, including pre and post-tensioning processes.

2: Find out losses in the prestressed concrete.

3: Analysis and design of prestressed concrete sections for flexure

4: Analyze and design for shear and end blocks in prestressed concrete.

5: Analysis of Statically Indeterminate Structures

UNIT – I

Introduction to prestressed concrete: Development Of Prestressed Concrete –Advantages And Disadvantages Of PSC Over RCC –General Principles Of Pre-Stressing-Pre Tensioning And Post Tensioning –Materials Used In PSC-High Strength Concrete –High Tension Steel-Different Types /Methods/Systems Of Prestressing.

UNIT – II

Losses Of Prestress: Estimation Of The Loss Of Prestress Due To Various Causes Like Elastic Shortening Of Concrete ,Creep Of Concrete, Shrinkage Of Concrete, Relaxation Of Steel, Slip In Anchorage, Friction Etc.

UNIT – III

Flexure & Deflections: Analysis Of Sections For Flexure In Accordance With Elastic Theory-Allowable Stresses-Design Criteria As Per I.S Code Of Practice –Elastic Design Of Beams (Rectangular, I And T Sections) For Flexure –Introduction To Partial Prestressing. Introduction-Factors Influencing Deflections-Short Term And Long Term Deflections Of Un-cracked And Cracked Members.

UNIT – IV

Shear, Bond, Bearing And Anchorage: Shear In PSC Beams –Principal Stresses – Conventional Elastic Design For Shear-Transfer Of Prestress In Pre-tensioned Members-Transmission Length –Bond Stresses-Bearing At Anchorage – Anchorage Zone Stresses In Post-Tensioned Members-Analysis And Design Of End Blocks By Guyon, Magnel And Approximate Methods –Anchorage Zone Reinforcements.

UNIT-V

DESIGN OF TENSION AND COMPRESSION MEMBERS

Design of tension members- application in the design of prestressed pipes and prestressed concrete cylindrical water tanks- Design of compression members with and without flexure – its application in the design piles, flag masts and similar structures..

REFERENCES :

1. Prestressed Concrete, Krishnaraju N., Tata McGraw Hill, New Delhi, 1981

2. Prestressed Concrete By S. Ramamrutham, Dhanpati Rai Pubilicartions.

3. Design of Prestressed Concrete Structures, Lin T.Y., Asia Publishing House, 1955

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PG Year: I	Semester:II	AK19 Regulations Branch of Study: CE			
Subject Code	Subject Name	L	T	P	Credits
19DMC9904	Constitution of India	2	0	0	0

Course Outcomes: At the end of the course, 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 passage of the Hindu Code Bill of 1956.
5. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.

UNIT – I

History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working), Philosophy of the Indian Constitution: Preamble Salient Features

UNIT – II

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 – III

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 – IV

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayat raj: Introduction, PRI: ZillaPachayat, Elected officials and their roles, CEO ZillaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT -V

Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

REFERENCES:

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.

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PG
Year: I   **Semester:II**

AK19 Regulations
Branch of Study: CE

Subject Code	Subject Name	L	T	P	Credits
19DPC2007	Structural Design Lab-II		0	4	2

Course Outcomes: At the end of the course, students will be able to
1. Design and Detail of Prestressed Concrete members
2. Design and Detail of Water Tanks.
3. Design and Detail of bridge girder and cylindrical shell.
4. Determine the Dynamic of tall building.
5. Design and Detailing of different foundations.

List of Experiments:

1. Dynamic analysis of tall buildings
3. Analysis and design of bridge girder
4. Analysis of Cylindrical shell
5. Analysis and Design of Water Tanks.
6. Design of Raft, Combined, Isolated foundations.
6. Analysis and Design of prestressed concrete continuous slab
7. Analysis and Design of prestressed concrete continuous beam

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

AK19 Regulations

Subject Code	Subject Name	L	T	P	Credits
19DPC2008	FEM Laboratory	0	0	4	2

Course Outcomes: At the end of the course, students will be able to
1. Identify mathematical model for solution of common engineering problems
2. Understand the concept of meshing for rectangular and circular plates
3. Analyze the bar elements and truss elements using FEM software
4. Analyze the 2D Frame and 3D frame using FEM software

List of Experiments/Assignments:
1. Discretisation of Geometry
2. Meshing a rectangular plate using 4 node elements
3. Meshing the circular plate using 3 node and 4 node elements
4. Analysis of an assembly of bar elements
5. Analysis of a stepped bar
6. Analysis of a plane truss
7. Analysis of a space truss
8. Analysis of a fixed beam
9. Analysis of a 2D-Frame
10. Analysis of a 3D-Frame

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PG
Year: I **Semester: I**

AK19 Regulations
Branch of Study: CE

Subject Code	Subject Name	L	T	P	Credits
19DML0101	Research Methodology and IPR	2	0	0	2

Course Outcomes: At the end of the course, students will be able to

1: To acquaint with basics of research problem formulation
2: Familiar with research related information and ethics.
3: aware about research report writing and presentation.
4: Understand and get knowledge of basic rights for protection of innovatives.
5: Understand different types of IPRs

Unit I

Introduction to Research – Types of Research, Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches to investigation of solutions for research Problem.

Unit II

Review of Literature and Data Collection - Effective literature studies approaches, analysis, Plagiarism and Research ethics.
Data collection, analysis, interpretation, Necessary instrumentations.

Unit III

Report Writing- Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

Unit IV

Intellectual Property Rights: Nature, Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit V

Patent Rights- Scope of Patent Rights, Licensing and transfer of technology, Patent information and databases, Geographical Indications.
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall, "Industrial Design", McGraw Hill, 1992.
6. Niebel, "Product Design", McGraw Hill, 1974.
7. Asimov, "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

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PG Year: II		Semester:I	AK19 Regulations Branch of Study: CE			
Subject Code	Subject Name			L	T	P	Credits
19DPE2015	Design of Industrial Structures			3	0	0	3

Course Outcomes: At the end of the course, the student will be able to:
1. Design Steel Gantry Girders.
2. Design Steel Portal, Gable Frames.
3. Design Steel Bunkers
4. DesignSilos.
5. Design Chimneys and Water Tanks.

UNIT – I

Plastic Analysis: Introduction, Limit analysis of steel structures, Mechanical properties of structural steel, Plastic hinge, Moment curvature relations, Limit load, Coplanar load, Upper lower bound theorems.

Planning and functional requirements- classification of industries and industrial structures- planning for layout- requirements regarding lighting ventilation and fire safety- protection against noise and vibrations.

UNIT – II

Design of Gantry Girders – Introduction, loads acting on gantry girder, permissible stress, types of gantry girders and crane rails, crane data, maximum moments and shears, construction detail, design procedure.

UNIT – III

Design of welded plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffeners - bearing stiffener– intermediate stiffeners – Design of web splice and flange splice

UNIT – IV

Design of Portal Frames – Design of portal frame with hinge base, design of portal frame with fixed base -Gable Structures – Lightweight Structures

UNIT -V

Design of Communication Towers: Analysis of Transmission line Towers: Loads on towers, Sag (dip) and Tension in uniformly loaded conductors, Analysis of towers (analysis as coplanar assembly), Design of members in towers, Design of foundation of towers. Design of Steel Chimneys for wind and gravity loads.

Reference Books:

1. Design of Steel Structure, Punmia B. C., Jain Ashok Kr., Jain Arun Kr., 2nd Ed., Lakshmi Publishers, 1998.
2. Design of Steel Structures, Ram Chandra, 12th Ed., Standard Publishers, 2009.
3. Design of Steel Structures, Subramaniyam.

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PG Year: II	Semester:I	AK19 Regulations Branch of Study: CE				
Subject Code	Subject Name		L	T	P	Credits
19DOE2002	Project Management		3	0	0	3

Course Outcomes: At the end of the course, students will be able to

1. Able to understand the importance of construction project management, organization and leadership capabilities

2. Able to apply theoretical and practical aspects of project management planning techniques to achieve project goals.

3. Possess ideas on contract, tender and arbitration in construction projects.

4. Understand to apply knowledge and skills of quality and safety management in construction.

5. Have necessary knowledge in resource planning, costing and accounting.

Unit I

Introduction to Project management: Characteristics of projects, Definition and objectives of Project Management, Stages of Project Management, Project Planning Process, Establishing Project organization.

UNIT-II

Project Planning: Planning techniques- Bar Chart, Gantt Charts- Networks: basic terminology, preparation of CPM-computation of float values, critical paths-PERT-Determination of three time estimates- Comparison between CPM and PERT

UNIT-III

Resources Management: Flow chart of Resources Management, Labour's requirement, Factors behind the selection of equipment, Material Management- flow chart and functions.

Cost and Accounts Management: Cost–volume relationship-BasicCost Control System-Principle of accounting, Account process, Balance sheet.

Unit IV

Project Implementation: Project Monitoring and Control with PERT/Cost, Computers applications in Project Management, Contract Management, Project Procurement Management.

UNIT-V

Quality management

Inspection, quality control and quality assurance in projects- Cost of quality, cost versus quality levels- ISO standards- benefits-ISO 9001-2000 family of standards- Audit- types, ISO 9001-2000 for internal audit.

Safety management

Cause for accident in construction site- -Principle of safety- Role of safety personnel's - General safety conditions

Text/Reference Books:
REFERENCES:

1. Kumar Neeraj Jha, Construction Project Management Theory & Practice, Pearson Education Ltd., 2014.
2. Chitkara.K.K., Construction Project Management Planning Scheduling and Controlling, TataMcGraw-Hill, 2014

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

Year: II

Semester: II

Subject Code	Subject Name	L	T	P	Credits
20ABS9922	Mathematical Modeling & Optimization Techniques	3	0	0	3

Course Outcomes:

1. Know about the classifications and stages of mathematical modelling.
2. Understand building of mathematical models.
3. Study the behaviour of mathematical models.
4. Formulate a linear programming problem and solve it by various methods.
5. Give an optimal solution in assignment jobs, give transportation of items from sources to destinations.

Unit I: Introduction to Modelling, Building Models, Studying Models

What is mathematical modelling? What objectives can modelling achieve? Classifications of models Stages of modelling . Systems analysis- Making assumptions- Flow diagrams- Choosing mathematical equations.

Unit II: Studying Models

Equations from the literature- Analogies from physics-Data exploration, Dimensionless form - Asymptotic behaviour- Sensitivity analysis - Modelling model output

Unit III: Linear programming problems(LPP)

Linear programming problems (LPP)-Graphical method-Simplex method-Big M Method-Dual simplex method.

Unit IV: Transportation & Assignment Problem

Formulation of transportation model, Basic feasible solution using different methods, Optimality Methods, Unbalanced transportation problem, Degeneracy in transportation problems, Applications of Transportation problems. Assignment Problem: Formulation, unbalanced assignment problem, Travelling salesman problem.

Unit V: Game Theory

Formulation of games, Two person-Zero sum game, Mini max and Max min Principle, games with and without saddle point, Rules of dominance, Solving a 2x2 game using graphical method.

TEXT BOOKS:

1. Mathematical Modeling: by Majid Jaberi-Douraki and Seyed M. Moghadas
2. Operations Research , S.D. Sharma.

REFERENCES:

1. Mathematical Models in Applied Mechanics A.B. Tayler
2. Operations Research, An Introduction, Hamdy A. Taha, Pearson publishers.

Online Learning Resources:
https://people.maths.bris.ac.uk/~madjl/course_text.pdf

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Subject Code 20AHS9905	Subject Name **Universal Human Values**		Credit: 3

Course Objectives

1.   Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2.   Understanding (or developing clarity) of the harmony in the human being, family, society andnature/existence
3.   Strengthening of self-reflection.
4.   Development of commitment and courage to act.

UNIT – 1: Course Introduction - Need, Basic Guidelines, Content and Process for ValueEducation

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

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

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

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

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

- ❖ Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect

as the foundational values of relationship

❖ Understanding the meaning of Trust; Difference between intention and competence
❖ Understanding the meaning of Respect;' Difference between respect and differentiation; the other salient values in relationship

❖ Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
❖ Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family

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

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

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

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

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

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

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

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Course Outcomes:

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

1. Students are expected to become more aware of themselves, and their surroundings(family, society, nature)
2. They would become more responsible in life, and in handling problems with sustainablesolutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

5. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

TEXT BOOKS

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

REFERENCE BOOKS

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. FSchumacher. "Small is Beautiful"
6. Slow is Beautiful –Cecile Andrews
7. J C Kumarappa "Economy of Permanence"

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: TIRUPATI

Year: III **Semester: I** **Branch of Study: CE**

Subject Code	Subject Name	L	T	P	Credits
19APE0101	Building Planning and bye-laws	2	0	0	2

Course Outcomes: At the end of the course the student will able to

1. Understand the Principles of Building Planning
2. Understand the Building Bye–Laws and Regulations
3. Understand the Planning of Residential Buildings Public Buildings
4. Understand the Buildings Safety And Comfort
5. Understand the sign conventions and bonds doors and windows

UNIT – I

Principles of Building Planning: Types of buildings, types of residential buildings – site selection for residential building, orientation of buildings; aspect; prospect grouping, circulation, privacy, economy, flexibility and practical considerations.

UNIT – II

Building Bye–Laws and Regulations: Introduction – Objectives of building bye-laws – Principles underlying building bye-laws – Terminology – Floor area ratio (FAR), Floor space index (FSI) – Classification of buildings – Open space requirements – Built up area limitations – Height of the buildings – Wall thickness – Lighting and ventilation requirements.

UNIT – III

Planning of Residential Buildings: Introduction – Minimum standards for various parts of the buildings – Requirements of different rooms and their grouping – Veranda – Drawing room – Bed room – Kitchen – Dining room– Bath room

Public Buildings: Planning of Educational institutions, hospitals, Office buildings.

UNIT – IV

Buildings Safety And Comfort: Aspects of safety-structural, fire and constructional safety. Components of building automation system -fire-fighting, communication etc. design for thermal comfort, ventilation comfort, lighting comfort,

UNIT – V

SIGN CONVENTIONS AND BONDS: Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys, lead, zinc, tin,, earth, rock, timber and marble . English bond & Flemish bond; odd & even courses for one, one and half

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Course structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2020-21)
CIVIL ENGINEERING (CE)

Year: III   **Semester: II**

Subject Code	Subject Name	L	T	P	Credits
20APE0106	Remote Sensing and GIS	3	0	0	3

Course Outcomes: After the completion of the course student should be able to
1. Understand principles of aerial photography
2. Understand the concept of remote sensing
3. Understand the concept of GIS
4. Analyze the GIS spatial data
5. Apply the concepts of GIS in water resources

UNIT – I
INTRODUCTION TO PHOTOGRAMMETRY:
Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II
REMOTE SENSING :
Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III
GEOGRAPHIC INFORMATION SYSTEM:
Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.
TYPES OF DATA REPRESENTATION:
Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV
GIS SPATIAL ANALYSIS:
Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V
WATER RESOURCES APPLICATIONS:
Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:
1. Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2. Fundamentals of remote sensing by Gorge Joseph , Universities press, Hyderabad

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