Scheme of Instruction and Syllabi

Of

B.E. / B.TECH. I & II SEMESTERS

FOR

INFORMATION TECHNOLOGY

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)
Kokapet Village, Gandipet Mandal, Hyderabad– 500 075. Telangana
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CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

DEPARTMENT OF INFORMATION TECHNOLOGY

INSTITUTE VISION AND MISSION:

Vision: To be a Centre of Excellence in Technical Education and Research

Mission: To address the emerging needs through quality technical education and advanced research

DEPARTMENT VISION AND MISSION:

Vision
To be a center of excellence in the field of Information Technology that yields pioneers and research experts who can contribute for the socio-economic development of the nation.

Mission:

- To impart state-of-the-art value based education in the field of InformationTechnology.
- To collaborate with industries and research organizations and excel in the emerging areas ofresearch.
- To imbibe social responsibility instudents.
- To motivate students to be trend setters and technopreneurs.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS):

Graduates of IT will be able to:

1. Analyze and provide solutions for real world problems using state-of-the-art engineering, mathematics, computing knowledge and emerging technologies.
2. Exhibit professional leadership qualities and excel in interdisciplinary domains.
3. Demonstrate human values, professional ethics, skills and zeal for lifelong learning
4. Contribute to the research community and develop solutions to meet the needs of public and private sectors. /Work in emerging areas of research and develop solutions to meet the needs of public and private sectors.

PROGRAM SPECIFIC OUTCOMES (PSOS):

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

1. Contribute to the growth of the nation by providing IT enabled solutions.
2. Develop professional skills in the thrust areas like Computer Networks, Image Processing, Data Mining, Internet of Things, Cloud Computing and Information Security.
3. Pursue higher studies in specializations like Artificial Intelligence, Data Science, Cyber Security and Software Engineering in reputed Universities.

ABOUT THE DEPARTMENT:

Information Technology is the most flourishing and extremely pervasive Discipline that is witnessing an unprecedented Innovation in Technologies for Communication, Computation, and Interactivity. The Information Technology Department in CBIT started its journey in the year 2001 with an intake of 60 students. We now have strong Undergraduate Programs with an annual intake of **240 students**. The Department is presently offering **two UG programs**, one in **Information Technology** and the other in **Artificial Intelligence & Data Science**. At the **Postgraduate** level, the Department is offering specialization in **Artificial Intelligence & Data Science**.

The Department of Information Technology is committed to excellence in Teaching, Research and provides the right echo system for nurturing the budding professional skills of students. The Department has state-of-the-art Laboratories and provides enhanced Learning Facilities for students, to engage in Continuous Learning and Research. The students are imparted with Industry Relevant skills, which help them to get placed in world-class Organisations and for further excellence throughout their Professional careers.

ABOUT THE PROGRAM B.E. (IT):

B.E. Information Technology course is a specialized sub-domain of computers science whichfocuses on the real time applications. It is aimed at transforming engineering aspirants into qualified professionals who are capable of meeting the demands of the industry both technically and academically. The academic curriculum is designed in such a way that students will be *a*ble to become Technopreneurs.

This program covers engineering subjects and technologies like Computer Networks, Web-Based Applications, Artificial Intelligence, Embedded Systems, Security, Data Analytics etc.
IT industry is seen as one of the carriers of the economy. In this regard students of IT Program are placed well in reputed Organisations such as Microsoft, Oracle, JP Morgan and many more with good CTC.

Students who wish to continue studies after completion of their B.E. in IT degree can pursue M.Tech. Degree in Information Technology, Ms. Program in Foreign Universities, and can do any Certification courses.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

Scheme of Instructions of I Semester of B.E. – Information Technology as per AICTE Model Curriculum 2022-23

B.E. –INFORMATION TECHNOLOGY

SEMESTER – I

S. No	Course Code	Title of the Course	Scheme of Instruction			Credits
			Hours per Week			
			L	T	P/D	
THEORY						
1	22MTC01	Linear Algebra & Calculus	3	1	0	4
2	22PYC01	Optics and Semiconductor Physics	3	0	0	3
3	22CSC01	Problem Solving And Programming	2	1	0	3
4	22EGC01	English	2	0	0	2
PRACTICAL						
5	22PYC03	Optics and Semiconductor Physics Lab	0	0	3	1.5
6	22EGC02	English lab	0	0	2	1
7	22CSC02	Problem Solving and Programming Lab	0	0	3	1.5
8	22MEC01	CAD AND DRAFTING	0	1	3	2.5
9	22MEC38	Digital Fabrication Lab	0	0	3	1.5
TOTAL			**10**	**3**	**14**	**20**

L: Lecture **T: Tutorial** **D: Drawing** **P: Practical**

CIE - Continuous Internal Evaluation **SEE - Semester End Examination**

With effect from the Academic Year 2022-23

22MTC01

LINEAR ALGEBRA & CALCULUS

(CSE, CSE(AI&ML), CSE(IOT & Cyber Security including Block Chain Technology), IT, AI&ML, AI&DS)

Instruction	3 L+1T Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	4

Course Objectives:

1. To explain the Partial Derivatives and the extreme values of functions of two variables.
2. To discuss Physical interpretations of scalar and vector functions.
3. To discuss vector line, surface and volume integrals.
4. To explain the concepts of basis, dimension of vector space and matrix representation of a linear transformation.
5. To explain the solution of system of linear equations by Matrix Methods.

Course Outcomes:

Upon completing this course, students will be able to:

1. Determine the extreme values of functions of two variables.
2. Apply the vector differential operator to scalar and vector functions
3. Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems.
4. Determine the basis and dimension of a vector space, compute linear transformation.
5. Apply the Matrix Methods to solve the system of linear equations

UNIT-I

Partial Differentiation and Its Applications: Functions of two or more variables, Partial derivatives, Higher order partial derivatives, Total derivative, Differentiation of implicit functions, Jacobians, Taylor's expansion of functions of two variables, Maxima and minima of functions of two variables.

UNIT-II

Vector Differential Calculus and multiple Integrals: Scalar and Vector point functions, vector operator Del, Gradient, Directional derivative, Divergence, Curl, Del applied twice to point functions, Del applied to product of point functions (vector identities), Irrotational fields and Solenoidal fields, Double integral, Change of order of integration and Triple integrals.

UNIT-III

Vector Integral Calculus: Line integral, Surface integral and Volume integral. Verification of Green's theorem in a plane (without proof), verification of Stroke's theorem (without proof) and Gauss's divergence theorem (without proof).

UNIT-IV:

Vector space: Vector space, Subspace, linear combination of vectors, linear span, row and column spaces, linear dependent, independent vectors, basis, dimension, linear transformation, invertible transformation, matrix of linear transformation, kernel and range of LT, rank and nullity of LT-rank nullity theorem(without proof), change of basis.

UNIT-V

Matrices: Rank of a matrix, Echelon form, consistency of linear System of equations, Eigen values, Eigenvectors, Properties of Eigen values, Cayley-Hamilton theorem, Quadratic forms, Reduction of quadratic form to canonical form by linear transformation, Nature of quadratic form.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, KhannaPublishers,44th Edition, 2017.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Seymour Lipschutz, Schaum's Outline of Linear Algebra, 5th Edition, McGraw Hill, 2013.
4. Gilbert Strang, Introduction to linear algebra, 5th Edition, Wellesley - Cambridge press, 2016.

Suggested Reading:

1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw- Hill, New Delhi, 2008.
2. R.K. Jain, S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th edition, 2016.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/ Cole, 2005.
4. Kuldeep Singh, Linear algebra: step by step. OUP Oxford, 2013.

With effect from the Academic Year 2022-23

Code: 22PYC01

OPTICS AND SEMICONDUCTOR PHYSICS

(CSE, IT, CSE(AI&ML), CSE(IoT & Cyber Security including Block Chain Technology), AI&ML, AI&DS)

Instruction	3L Hours per week
Duration of SEE	3Hours
SEE	60Marks
CIE	40Marks
Credits	3

Course Objectives: The objectives of the course is to make the student

1. Understand the fundamentals of wave nature of flight
2. Acquire knowledge of lasers, holography and fiber optics
3. Familiarize with quantum mechanics
4. Learn the fundamental concepts of solids

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

1. Demonstrate the physical properties of light.
2. Explain characteristic properties of lasers and fiber optics
3. Find the applications of quantum mechanics
4. Classify the solids depending upon electrical conductivity
5. Identify different types of semiconductors

UNIT-I

Wave Optics: Huygens' principle –Superposition of waves –Interference of light by wave front splitting and amplitude splitting–Fresnel's biprism – Interference in thin films in reflected light– Newton's rings– Fraunhofer diffraction from a single slit –Double slit diffraction – Rayleigh criterion for limit of resolution– Concept of N-slits–Diffraction grating and its resolving power.

UNIT-II

Lasers & Holography: Characteristics of lasers – Einstein's coefficients –Amplification of light by population inversion –Different types of lasers: solid-state lasers: Ruby & Nd:YAG; gas lasers: He-Ne & CO_2; semiconductor laser –Applications of lasers in engineering and medicine. Holography: Principle – Recording and reconstruction–Applications.

Fiber Optics: Introduction –Construction –Principle –Propagation of light through an optical fiber – Numerical aperture and acceptance angle –Step-index and graded-index fibers –Pulse dispersion –Fiber losses--Fiber optic communication system –Applications.

UNIT-III

Principles of Quantum Mechanics: Introduction –Wave nature of particles – de-Broglie hypothesis – Physical significance of ψ –Time-dependent and time-independent Schrodinger equations – Born interpretation – Probability current –Wave packets –Uncertainty principle – Particle in infinite square well potential –Scattering from potential step – Potential barrier and tunneling.

UNIT-IV

Band Theory of Solids: Salient features of free electron theory of metals (Classical and Quantum) – Fermi level –Density of states – Bloch's theorem for particles in a periodic potential – Kronig-Penney model – Classification of solids: metals, semiconductors and insulators.

UNIT-V

Semiconductors: Intrinsic and extrinsic semiconductors –Charge carrier concentration in intrinsic semiconductors –Dependence of Fermi level on carrier concentration and temperature in extrinsic semiconductors (qualitative) –Carrier generation and recombination –Carrier transport: diffusion and drift – P-N junction – Thermistor – Hall effect – LED –Solar cell.

TEXT BOOKS:

1. B.K. Pandey and S. Chaturvedi, *Engineering Physics*, Cengage Publications,2012.
2. M.N. Avadhanulu and P.G. Kshirsagar, *A Text Book of Engineering Physics*, S. Chand Publications, 2014.
3. M. Arumugam, *Materials Science*, Anuradha Publications,2015.
4. S.L. Gupta and Sanjeev Gupta, *Modern Engineering Physics*, Dhanpat Rai Publications,2011.

SUGGESTD READING:

1. R. Murugeshan and KiruthigaSivaprasath, *Modern Physics*, S. Chand Publications S. Chand Publications,2014.
2. V. Rajendran, *Engineering Physics*, McGraw-Hill Education Publications,2013.
3. P.K. Palanisamy, *Engineering Physics*, Scitech Publications,2012.
4. V. Raghavan, *Materials Science and Engineering*, Prentice Hall India Learning Private Limited; 6th Revised edition,2015.

With effect from the Academic Year 2022-23

22CSC01

PROBLEM SOLVING AND PROGRAMMING

Instruction	2L+1T Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objectives: The objectives of this course are to:

1. Develop logical skills and basic technical skills so that students should be able to solve basic computational problems.
2. Learn any basic programming language.

Course Outcomes: After completion of course, students would be able to:

1. Understand real world problems and develop computer solutions for those problems.
2. Understand the basics of Python.
3. Apply Python for solving basic programming solutions.
4. Create algorithms/flowcharts for solving real-time problems.
5. Build and manage dictionaries to manage data
6. Handle data using files

UNIT I:

Introduction to Programming - *Evolution of languages*: Machine, Assembly and High-level languages. *Software requirements for programming*: OS, compiler, linker, loader, editor. Design specification: Algorithms and Flowcharts.

UNIT II:

Data Types and Operators, Variable, Sequences and Iteration - Data types, Expressions, Precedence Rules, Operators: arithmetic, relational, logical, bit-wise and miscellaneous operators; local variable, global variables, List, String, Tuples, Sequence mutation and accumulating patterns.

UNIT III:

Conditional Statement, Loops, Arrays and Strings, user-defined Data Types -if..else, for, while, nested iteration, Concept and use of arrays, declaration and usage of arrays, 2-dimensional arrays, different types of user defined data types.

UNIT IV:

Dictionaries and Dictionary Accumulation, Functions/Methods - Dictionary basics, operations, methods, accumulation, advantages of modularizing program into functions, function definition and function invocation. Positional parameters passing arrays to functions, recursion, library functions.

UNIT V:

File Handling and Memory Management - Concepts of files and basic file operations, writing/reading data to/from a .csv file, Memory Management Operations.

Text Books and References:

1. R.S. Salaria, Khanna , “Programming for Problem Solving”, Book Publishing Co., Delhi.
2. Jeeva Jose, Khanna , “Taming Python by Programming”, Book Publishing Co., Delhi.
3. Mark Lutz, “Learning Python”, 5th Edition, , O'Reilly Media, Inc.,
4. Python Crash Course: A Hands-On, Project-Based Introduction to Programming by No Starch Press.
5. Eric Matthes,, “Programming in Python”, R.S. Salaria, Khanna Book Publishing Co., Delhi.
6. https://www.coursera.org/specializations/python-3-programming.

NPTEL/SWAYAM Course:

1. Introduction to Problem Solving and Programming, Video Lectures, Prof. D Gupta , IIT Delhi.
2. Problem Solving Aspects and Python Programming, Dr. S Malinga, Dr Thangarajan, Dr. S V Kogilavani, Kongu Engineering College.

With effect from the Academic Year 2022-23

22EGC01

ENGLISH

(Common to All Branches)

Instruction	2L Hours per week
Duration of SEE	3Hours
SEE	60 Marks
CIE	40 Marks
Credits	2

Course Objectives: This course will introduce the students:

1. To the role and importance of communication while developing their basic communication skills in English.
2. To basics of writing coherent paragraphs and formal emails.
3. To techniques of writing a précis and formal letters by using acceptable grammar and appropriate vocabulary.
4. To description, definition and classification of processes while enabling them to draft formal reports following a proper structure.
5. To gaining adequate reading comprehension techniques.

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

1. Illustrate the nature, process and types of communication and communicate effectively without barriers.
2. Construct and compose coherent paragraphs, emails and adhering to appropriate mobile etiquette.
3. Apply techniques of precision to write a précis and formal letters by using acceptable grammar and appropriate vocabulary.
4. Distinguish formal from informal reports and demonstrate advanced writing skills by drafting formal reports.
5. Critique passages by applying effective reading techniques

UNIT-I

Understanding Communication in English:

Introduction, nature and importance of communication; Process of communication; Types of communication - verbal and non-verbal; Barriers to communication; Intrapersonal and interpersonal communication; Understanding Johari Window.

Vocabulary & Grammar: The concept of Word Formation; Use of appropriate prepositions and articles.

UNIT-II

Developing Writing Skills I:

Paragraph writing. – Structure and features of a paragraph; Cohesion and coherence. Rearranging jumbled sentences. Email and Mobile etiquette.

Vocabulary & Grammar: Use of cohesive devices and correct punctuation.

UNIT-III

Developing Writing Skills II:

Précis Writing; Techniques of writing precisely. Letter Writing – Structure, format of a formal

letter; Letter of request and the response
Vocabulary and Grammar: Subject-verb agreement. Use of prefixes and suffixes to form derivatives. Avoiding redundancies.

UNIT-IV

Developing Writing Skills III:

Report writing – Importance, structure, elements of style of formal reports; Writing a formal report.
Vocabulary and Grammar: Avoiding ambiguity - Misplaced modifiers. Use of synonyms and antonyms.

UNIT-V

Developing Reading Skills:

The reading process, purpose, different kinds of texts; Reading comprehension; Techniques of comprehension – skimming, scanning, drawing inferences and conclusions.
Vocabulary and Grammar: Words often confused; Use of standard abbreviations.

Text Books:

1. Language and Life: A Skills Approach, Board of Editors, Orient Black Swan,2017.
2. Swan Michael, Practical English Usage.OUP.1995.

Suggested Readings:

1. Wood F.T, Remedial English Grammar,Macmillan,2007
2. Zinsser William, On Writing Well, Harper Resource Book, 2001
3. Sanjay Kumar and PushpLata, Communication Skills. Oxford University Press,2011.

With effect from the Academic Year 2022-23

22PYC03

OPTICS AND SEMICONDUCTOR PHYSICS LAB

(CSE, IT, CSE (AI&ML), CSE (IoT & Cyber Security including Block Chain Technology), AI&ML, AI&DS)

Instruction	3P Hours per week
Duration of SEE	3Hours
SEE	50Marks
CIE	50Marks
Credits	1.5

Course Objectives: The objectives of the course is to make the student

1. Apply theoretical physics knowledge in doing experiments
2. Understand the behaviour of the light experimentally
3. Analyze the conduction behaviour of semiconductor materials and optoelectronic devices

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

1. Interpret the errors in the results of an experiment.
2. Demonstrate physical properties of light experimentally
3. Make use of lasers and optical fibers for engineering applications
4. Explain the V-I characteristics of some optoelectronic and semiconductor devices
5. Find the applications thermistor

Experiments

1.	Error Analysis	:	Estimation of errors in the determination of time period of a torsional pendulum
2.	Fresnel's Biprism	:	Determination of wavelength of given monochromatic source
3.	Newton's Rings	:	Determination of wavelength of given monochromatic source
4.	Single Slit Diffraction	:	Determination of wavelength of given monochromatic source
5.	Diffraction Grating	:	Determination of wavelengths of two yellow lines of light of mercury lamp
6.	Laser	:	Determination of wavelength of given semiconductor laser
7.	Holography	:	Recording and reconstruction of a hologram
8.	Optical Fiber	:	Determination of numerical aperture and power losses of given optical fiber
9.	Energy Gap	:	Determination of energy gap of given semiconductor
10.	P-N Junction Diode	:	Study of V-I characteristics and calculation of resistance of given diode in forward bias and reverse bias
11.	Thermistor	:	Determination of temperature coefficient of resistance of given thermistor
12.	Hall Effect	:	Determination of Hall coefficient, carrier concentration and mobility of charge carriers of given semiconductor specimen
13.	LED	:	Study of I-V characteristics of given LED
14.	Solar Cell	:	Study of I-V characteristics of given solar cell and calculation of fill factor, efficiency and series resistance
15.	Planck's Constant	:	Determination of Planck's constant using photo cell

NOTE: A minimum of TWELVE experiments should be done.

With effect from the Academic Year 2022-23

22EGC02

ENGLISH LAB
(Common to All Branches)

Instruction	2P Hours per week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1

Course Objectives: This course will introduce the students:

1. To nuances of Phonetics and give them sufficient practice in correct pronunciation.
2. To word stress and intonation.
3. To listen to listening comprehension material for honing their listening skills.
4. To activities enabling them overcome their inhibitions while speaking in English with the focus being on fluency rather than accuracy.
5. To team work, role behavior while developing their ability to discuss in groups and making oral presentations.

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

1. Define the speech sounds in English and understand the nuances of pronunciation in English
2. Apply stress correctly and speak with the proper tone, intonation and rhythm.
3. Analyze listening comprehension texts to enhance their listening skills.
4. Determine the context and speak appropriately in various situations.
5. Design and present effective posters while working in teams ,and discuss and participate in Group discussions.

Exercises

1. **Introduction to English Phonetics**: Introduction to auditory, acoustic and articulatory phonetics, organs of speech: the respiratory, articulatory and phonatory systems.
2. **Sound system of English**: Phonetic sounds and phonemic sounds, introduction to international phonetic alphabet, classification and description of English phonemic sounds, minimal pairs . The syllable: types of syllables, consonant clusters.
3. **Word stress**: Primary stress, secondary stress, functional stress, rules of word stress.
4. **Rhythm & Intonation** : Introduction to Rhythm and Intonation. Major patterns, intonation of English with the semantic implications.
5. **Listening skills** – Practice with Software available in (K-van solutions)
6. **Public speaking –** Speaking with confidence and clarity in different contexts on various issues.
7. **Group Discussions -** Dynamics of a group discussion, group discussion techniques, body language.
8. **Pictionary –** weaving an imaginative story around a given picture.
9. **Information Gap Activity –** Writing a brief report on a newspaper headline by building on the hints given
10. **Poster presentation –** Theme, poster preparation, team work and representation.

Suggested Reading

1. T Balasubramanian. A Textbook of English Phonetics for Indian Students, Macmillan,2008.
2. J Sethi et al. A Practical Course in English Pronunciation (with CD), Prentice Hall India,2005.
3. PriyadarshiPatnaik. Group Discussions and Interviews, Cambridge University Press Pvt Ltd2011
4. ArunaKoneru, Professional Speaking Skills, Oxford University Press,2016

With effect from the Academic Year 2022-23

22CSC02

PROBLEM SOLVING AND PROGRAMMING LAB

Instruction	3P Hours per week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1.5

Course Objectives: The objectives of this course are to:

1. Master the fundamentals of writing Python scripts
2. Learn Python elements such as variables, flow controls structures, and functions
3. Discover how to work with lists and sequence data, and files

Course Outcomes: After completion of course, students would be able to:

1. Understand various Python program development Environments
2. Demonstrate the concepts of Python.
3. Implement algorithms/flowcharts using Python to solve real-world problems.
4. Build and manage dictionaries to manage data.
5. Write Python functions to facilitate code reuse.
6. Use Python to handle files and memory.

Laboratory / Practical Experiments:

1. Explore various Python Program Development Environments.
2. Demonstration of input/output operations
3. Demonstration of operators
4. Demonstration of selective control structures
5. Demonstration of looping control structures
6. Demonstration of Python Dictionaries.
7. Implementation of searching and sorting techniques.
8. Implementation of string manipulation operations
9. File handling and memory management operations

Text Books and References:

1. R.S Salaria, Khanna, (Programming for Problem Solving", Book Publishing Co., Delhi
2. Jeeva Jose, Khanna,, "Taming Python by Programming", Book Publishing Co., Delhi

With effect from the Academic Year2020-21

22MEC01

CAD AND DRAFTING

Instruction	1 T + 3 D Hours per week
Duration of SEE	3Hours
SEE	50Marks
CIE	50Marks
Credits	2.5

Course Objectives:

1. To get exposure to a cad package and its utility.
2. Understanding orthographic projections.
3. To visualize different solids and their sections in orthographic projection
4. To prepare the student to communicate effectively by using isometric projection.
5. To prepare the student to use the techniques, skills, and modern tools necessary for practice.

Outcomes: At the end of the course, the Students are able to

1. Become conversant with appropriate use of CAD software for drafting.
2. Recognize BIS, ISO Standards and conventions in Engineering Drafting.
3. Construct the projections of points, lines, planes, solids
4. Analyse the internal details of solids through sectional views
5. Create an isometric projections and views

List of Exercises:

1. Introduction to CAD package: Settings, draw, modify tools, dimensioning and documentation
2. Construction of Conic Sections by General method
3. Orthographic projection: Principles, conventions, Projection of points
4. Projection of straight lines: Simple position, inclined to one plane
5. Projection of straight lines inclined to both the planes (without traces and mid-point)
6. Projection of planes: Perpendicular planes
7. Projection of planes: Oblique planes
8. Projection of solids: Simple position
9. Projection of solids: Inclined to one plane
10. Sections of solids: Prism, pyramid in simple position
11. Sections of solids: Cone and cylinder in simple position
12. Isometric projections and views
13. Conversion of isometric views to orthographic projections and vice-versa.

Text Books:

1. N.D.Bhatt, “Elementary Engineering Drawing”, Charotar Publishers,2012.
2. K.Venugopal, “Engineering Drawing and Graphics + AutoCAD”,New Age International Pvt.Ltd,2011.
3. Basanth Agrawal and C M Agrawal, “Engineering Drawing”, 2/e, McGraw-Hill Education (India) Pvt.Ltd.

Suggested Reading:

1. Shaw M.B and Rana B.C., “Engineering Drawing”, 2/e, Pearson,2009.
2. K.L. Narayana and P.K. Kannaiah, “Text Book of Engineering Drawing”, Scitech Publications,2011.

With Effect from the Academic Year 2022–23

22 MEC38

DIGITAL FABRICATION LAB

Instruction	3P Hours per week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1.5

Objectives: The objectives of this course are to:

1. Give a feel of Engineering Practices & develop holistic understanding of various Engineering materials and Manufacturing processes.
2. Develop skills of manufacturing, safety, precision, quality, intelligent effort, optimization, positive &team work attitude to get things right the first time.
3. Provide basic knowledge of Steel, Plastic, Composite and other materials for suitable applications.
4. Study of Principle and hands on practice on techniques of fabrication, welding, casting, manufacturing, metrology, and allied skills.
5. Advance important hard & pertinent soft skills, productivity, create skilled manpower which is cognizant of industrial workshop components and processes and can communicate their work in a technical, clear and effective way.

Outcomes: After completion of course, students would be able to:

1. Understand safety measures to be followed in workshop to avoid accidents.
2. Identify various tools used in fitting, carpentry, tin smithy, house wiring, welding, casting and machining processes.
3. Make a given model by using workshop trades including fitting, carpentry, tinsmithy and House wiring.
4. Perform various operations in welding, machining and casting processes.
5. Conceptualize and produce simple device/mechanism of their choice.

List of exercises:
Group-1

1. To make a lap joint on the given wooden piece according to the given dimensions.
2. To make a dove tail-joint on the given wooden piece according to the given dimensions.
3. a)Wiring of one light point controlled by one single pole switch, a three pin socket controlled by a single pole switch
   b) Wiring of two light points connected in series and controlled by single pole switch. Verify the above circuit with different bulbs. Wiring of two light points connected in parallel from two single pole switches and a three pin socket
4. Stair case wiring-wiring of one light point controlled from two different places independently using two 2- way switches.
5. To make external threads for GI pipes using die and connect the GI pipes as per the given diagram using taps, couplings & bends.
6. To connect the GI pipes as per the given diagram using, couplings, unions, reducer & bends.
   To connect the GI pipes as per the given diagram using shower, tap & valves and Demonstrate by giving water connection

Group- 2

1. To Study the method of Additive Manufacturing process using a 3D printer
2. To create a 3D CAD model of a door bracket using a modeling software
3. To Print a door bracket using an extruder type 3D Printer.
4. To create a 3D CAD model by reverse Engineering
5. To Design an innovative component using the CAD software
6. To Print the selected innovative component by the students using a 3D printer

Text Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Elements of Workshop Technology, Vol. I, 2008 and Vol. II, Media promoters and publishers private limited, Mumbai, 2010.
2. Kalpakjian S. And Steven S. Schmid, Manufacturing Engineering and Technology, 4th edition, Pearson Education India Edition, 2002.
3. Sachidanand Jha , 3D PRINTING PROJECTS: 200 3D Practice Drawings For 3D Printing On Your 3D Printer , June 7, 2019.

Suggested Reading:

1. Gowri P. Hariharan and A. Suresh Babu, Manufacturing Technology – I, Pearson Education, 2008.
2. Oliver Bothmann , 3D Printers: A Beginner's Guide , January 1, 2015

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

AICTE MODEL CURRICULUM (with effect from 2022-23)

B.E.–Information Technology

SEMESTER -II

S. No	Course Code	Title of the Course	Scheme of Instruction			Credits
			Hours per Week			
			L	T	P/D	
THEORY						
1	22MTC04	Differential Equations & Numerical Methods	3	1	0	4
2	22CYC01	Chemistry	3	0	0	3
3	22EEC01	Basic Electrical Engineering	2	1	0	3
4	22CSC03	Object Oriented Programming	2	1	0	3
PRACTICAL						
5	22CYC02	Chemistry Lab	0	0	3	1.5
6	22MBC02	Community Engagement	0	0	3	1.5
7	22CSC04	Object-Oriented Programming Lab	0	0	2	1
8	22MEC37	Robotics & Drones Lab	0	2	2	3
9	22EEC02	Basic Electrical Engineering Lab	0	0	2	1
TOTAL			**10**	**5**	**12**	**21**

L: Lecture **T: Tutorial** **D: Drawing** **P: Practical**

CIE - Continuous Internal Evaluation **SEE - Semester End Examination**

With effect from the Academic Year 2022-23

22MTC04

DIFFERENTIAL EQUATIONS & NUMERICAL METHODS
(CSE, CSE(AI&ML), CSE(IOT & Cyber Security including Block Chain Technology), IT, AI&ML, AI&DS)

Instruction	3 L+1T per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	4

Course Objectives:

1. To explain the relevant methods to solve first order differential equations.
2. To explain the relevant methods to solve higher order differential equations.
3. To discuss numerical methods to solve algebraic and transcendental equations.
4. To discuss the interpolation and numerical differentiation.
5. To discuss convergence and divergence of Infinite series.

Course Outcomes:

Upon completing this course, students will be able to:

1. Calculate the solutions of first order linear differential equations.
2. Calculate the solutions of higher order linear differential equations.
3. Solve the algebraic, transcendental and system of equations.
4. Apply interpolation and numerical differentiation techniques for given data.
5. Test the convergence and divergence of Infinite series.

UNIT - I

Differential Equations of First Order: Exact Differential Equations, Equations Reducible to Exact Equations, Linear Equations, Bernoulli's Equations, Riccati's and Clairaut's Equations, Orthogonal trajectories, Rate of decay of radio-active materials.

UNIT-II

Higher Order Linear Differential Equations: Higher order linear differential equations with constant coefficients, rules for finding Complementary function, Particular Integral and General solution. Method of Variation of Parameters, solution of Cauchy- Euler equation. LR and LCR circuits.

UNIT-III

Numerical solution of equations: Numerical solutions of algebraic and transcendental equations by Bisection method, Regula-falsi method and Newton-Raphson's method, Solution of system of linear equations by LU decomposition methods, Crout's method, Jacobi's method, Gauss Seidel method.

UNIT-IV

Interpolation and Numerical Differentiation: Forward, Backward and Central differences, Newton's forward and backward interpolation formulae, Gauss's forward and backward interpolation formulae, Lagrange interpolation, Numerical differentiation at the tabulated points with forward, backward and central differences**.**

UNIT-V

Infinite Series: Convergence of sequence and series. Series of positive terms, Necessary condition for convergence, Comparison tests, limit form comparison test, D'Alembert's Ratio test, Raabe's test, Cauchy's root test, Alternating series, Leibnitz's rule, absolutely and conditionally convergence.

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.
3. M.K. Jain, S.R.K Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering and Computation, New age International Publications, 2008.

Suggested Reading:

1. R.K.Jain, S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th edition, 2016.
2. Ramana B.V, Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11th Reprint, 2010.
3. A.R.Vasishtha and R.K.Guptha, Integral Transforms, Krishna's Educational Publishers, Reprint, 2014.

With effect from the Academic Year 2022-23

22CYC01

CHEMISTRY

(Common to All Branches)

Instruction:	3L Hours per Week
Duration of SEE:	3 Hours
SEE	60 Marks
CIE:	40 Marks
Credits:	3

Course Objectives

1. This syllabus helps at providing the concepts of chemical bonding and chemical kinetics to the students aspiring to become practicing engineers
2. Thermodynamic and Electrochemistry units give conceptual knowledge about processes and how they can be producing electrical energy and efficiency of systems.
3. To teach students the value of chemistry and to improve the research opportunities knowledge of stereochemistry and organic reactions is essential.
4. Water chemistry unit impart the knowledge and understand the role of chemistry in the daily life.
5. New materials lead to discovering of technologies in strategic areas for which an insight into Polymers, nanomaterials and basic drugs of modern chemistry is essential.

Course Outcomes

At the end of the course student will be able to:

1. Identify the microscopic chemistry in terms of molecular orbitals, intermolecular forces and rate of chemical reactions.
2. Discuss the properties and processes using thermodynamic functions, electrochemical cells and their role in batteries and fuel cells.
3. Illustrate the major chemical reactions that are used in the synthesis of organic molecules.
4. Classify the various methods used in treatment of water for domestic and industrial use.
5. Outline the synthesis of various Engineering materials & Drugs.

UNIT-I

Atomic and molecular structure and Chemical Kinetics:

Atomic and molecular structure: Molecular Orbital theory - atomic and molecular orbitals. Linear combination of atomic orbitals (LCAO) method. Molecular orbitals of diatomic molecules. Molecular Orbital Energy level diagrams (MOED) of diatomic molecules & molecular ions (H_2 , He_2^+ ,N_2 , O_2 , O_2^- , CO, NO). Pi- molecular orbitals of benzene and its aromaticity.

Chemical Kinetics: Introduction, Terms involved in kinetics: rate of reaction, order & molecularity; First order reaction-Characteristics: units of first order rate constant & its half-life period, second order reaction-Characteristics: units of second order rate constant & its half- life period. Numericals.

UNIT-II

Use of free energy in chemical equilibria

Use of free energy in chemical equilibria: Thermodynamic functions: Internal energy, entropy and free energy. Significance of entropy and free energy (criteria of spontaneity). Free energy and emf (Gibbs Helmholtz equations and its applications). Cell potentials, electrode potentials, – Reference electrodes (NHE, SCE)-electrochemical series. Nernst equation and its applications. Determination of pH using combined Glass & Calomel electrode. Potentiometric Acid base & Redox Titrations. Numericals.

Battery technology: Rechargeable batteries & Fuel cells.

Lithium batteries: Introduction, construction, working and applications of Li-MnO_2 and Li-ion batteries.
Fuel Cells: Introduction, difference between conventional cell and fuel cell, limitations & advantages.
Construction, working & applications of methanol-oxygen fuel cell.

UNIT- III

Stereochemistry and Organic reactions

Stereochemistry: Representations of 3 dimensional structures, Types of stereoisomerism- Conformational isomerism – confirmations of n-butane (Newman and sawhorse representations), Configurational isomerism -Geometrical (cis-trans) isomerism & Optical isomerism- optical activity, Symmetry and chirality: Enantiomers (lactic acid)&Diastereomers (Tartaric acid), Absolute configurations, Sequence rules for R&S notation.

Types of Organic reactions: Substitution Reactions- Electrophilic substitution (Nitration of Benzene); Nucleophilic Substitution (S_N1& S_N2); Free Radical Substitution (Halogenation of Alkanes)
Addition Reactions: Electrophilic Addition – Markonikoff's rule, Free radical Addition - Anti Markonikoff's rule (Peroxide effect), Nucleophilic Addition – (Addition of HCN to carbonyl compounds)
Eliminations-E1 and E2 (dehydrohalogenation of alkyl halides)
Cyclization (Diels - Alder reaction)

UNIT–IV

Water Chemistry:

Hardness of water – Types, units of hardness, Disadvantages of hard water, Alkalinity and Estimation of Alkalinity of water, Boiler troubles - scales & sludge formation, causes and effects, Softening of water by lime soda process (Cold lime soda process),ion exchange method and Reverse Osmosis. Specifications of potable water & industrial water. Disinfection of water by Chlorination; break point chlorination, BOD and COD definition, Estimation (only brief procedure) and significance, Numericals.

UNIT-V

Engineering Materials and Drugs:

Introduction, Terms used in polymer science; Thermoplastic polymers (PVC) &Thermosetting polymers (Bakelite); Elastomers (Natural rubber). Conducting polymers- Definition, classification and applications.

Polymers for Electronics: Polymer resists for integrated circuit fabrication, lithography and photolithography.

Nano materials-Introduction to nano materials and general applications, basic chemical methods of preparation- Sol-gel method. Carbon nanotubes and their applications. Characterisation of nanomaterials by SEM and TEM (only Principle).

Drugs-Introduction, Synthesis and uses of Aspirin (analgesic), Paracetamol (Antipyretic), Atenolol (antihypertensive).

Text Books:

1. P.C. Jain and M. Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company Ltd.,New Delhi,16th edition (2015).
2. W.U. Malik, G.D.Tuli and R.D.Madan, "Selected topics in Inorganic Chemistry", S Chand & Company Ltd, New Delhi, reprint (2009).
3. R.T. Morrison, R.N. Boyd and S.K. Bhattacharjee, "Organic Chemistry", Pearson,Delhi, 7th edition(2019).
4. A Textbook of Polymer Science and Technology , Shashi Chawla,Dhanpat Rai & Co. (2014)
5. T. Pradeep, Nano: The Essentials, Tata McGraw-Hill Education, Delhi, 2012
6. G.L. David Krupadanam, D. Vijaya Prasad, K. Varaprasad Rao, K.L.N. Reddy and C.Sudhakar, "Drugs", Universities Press (India) Limited, Hyderabad (2007).

Suggested Readings:

1. B. H. Mahan, "University Chemistry", Narosa Publishing house, New Delhi, 3rd edition (2013).
2. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. Nagin Chand & Company Ltd., 46thedition(2013).
3. T.W. Graham Solomons, C.B. Fryhle and S.A. Snyder, "Organic Chemistry", Wiley,12th edition (2017).
4. P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford, 8th edition (2006).

With effect from the Academic Year 2022-2023

22EEC01 BASIC ELECTRICAL ENGINEERING

Instruction	2L + 1T Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objectives:

1. To understand the behaviour of different circuit elements R, L & C, and the basic concepts of electrical AC circuit analysis
2. To comprehend the basic principle of operation of AC and DC machines
3. To infer about different types of electrical wires and cables, domestic and industrial wiring. safety rules and methods of earthing.

Course Outcomes: After the completion of this course, the student will be able to

1. Understand the concepts of Kirchhoff's laws and their application various theorems to get solution of simple dc circuits.
2. Predict the steady state response of RLC circuits with AC single phase/three phase supply.
3. Infer the basics of single phase transformer
4. Describe the construction, working principle of DC machine and 3-phase Induction motor.
5. Acquire the knowledge of electrical wires, cables, earthing, Electrical safety precautions to be followed in electrical installations and electric shock and its safety and energy calculations.

UNIT-I

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation, Superposition, Thevenin's and Norton's Theorems.

UNIT-II

AC Circuits: 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 R, L, C, series RL and RC. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III

Single Phase Transformer: Construction, Working principle, EMF Equation, Ideal and Practical transformer, Equivalent circuit of Transformer, OC and SC tests on a transformer, Efficiency and Regulation

UNIT-IV

DC and AC Machines: DC Generators: Construction, Principle of operation, EMF equation, Classification, Characteristics of shunt generators. DC Motors: Classification, Torque Equation, Characteristics and Speed control of DC Shunt and Series Motors, Losses and efficiency Three - Phase Induction Motors: Principle of operation, Applications

UNIT-V

Electrical Installations: Electrical Wiring: Types of wires and cables, Electrical Safety precautions in handling electrical appliances, electric shock, first aid for electric shock, safety rules. Components of LT

Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Earthing (Elementary Treatment only), Elementary calculations for energy consumption

Text Books:

1. L. S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 2011.
2. E. Hughes, Electrical and Electronics Technology, Pearson, 2010.

Suggested Reading:

1. D. P. Kothari & I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989
3. D.C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
4. P.V. Prasad, S. Sivanagaraju, R. Prasad, "Basic Electrical and Electronics Engineering" Cengage Learning, 1st Edition, 201

With effect from the Academic Year 2022-23

22CSC03

OBJECT ORIENTED PROGRAMMING

Instruction	2L+1T Hours per week
Duration of SEE	3 Hours
SEE	60 Marks
CIE	40 Marks
Credits	3

Course Objectives: The objectives of this course are to:

1. Explore the concepts object-oriented programming like classes, constructors, Polymorphism, Inheritance, and File handling.
2. Prepare student for solving real-world problems using OOPs concepts.

Course Outcomes: After completion of course, students would be able to:

1. Understand the concepts of Object-Oriented features.
2. Apply OOPs concepts and different libraries to solve programming problems.
3. Understand the advanced concepts of Python.
4. Develop programs to access databases and web data.
5. Understand APIs and third-party libraries to be used with Python.

UNIT I:

Introduction to Object Oriented Programming Paradigms - Programming paradigms, advantages of OOP, comparison of OOP with Procedural Paradigms; Classes and Objects: Prototyping, referencing the variables in functions, inline, static and friend functions. Memory allocation for classes and objects, arrays of objects, constructors.

UNIT II :

Polymorphism and Inheritance: Overriding methods, type conversions, base classes and derived classes, types of inheritance, various types of classes, invocation of constructors and destructors inheritance, aggregation, composition, classification hierarchies, metaclass/ abstract classes, unit testing and exceptions.

UNIT III:

Python Libraries -Basics of Open Source libraries for data pre-processing, modeling and visualization.

UNIT IV:

Python to access Web Data - Regular Expressions, extracting data, sockets, using the Developer Console to Explore HTTP, Retrieving Web Page, and Passing Web Pages.

UNIT V:

Using Databases with Python - Using Databases, Single Table CRUD, Designing and representing a data model, reconstructing data with JOIN, many-to-many relationships.

Text Books and References:

1. Allen Downey, Jeff Elkner, Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python", SoHo Books, 2009.
2. R.S. Salaria , "Mastering Object-Oriented Programming", Khanna Book Publishing Co., Delhi
3. Jeeva Jose, "Introduction to Computing & Problem Solving with Python", Khanna Book Publishing, 2019.
4. https://www.coursera.org/specializations/python-3-programming#courses
5. Paul Barry , "Head First Python", O'Reilly, 2010

NPTEL/SWAYAM Course:

1. Python for Data Science, Prof. Raghunathan Rengasamy, IIT Madras
2. The Joy of Computing using Python Prof. Sudarshan, Prof. Yayati Guptaingar, IIT Ropar, IIIT Dharwad.

With effect from the Academic Year 2022-23

22CYC02

CHEMISTRY LAB

(Common to All Branches)

Instruction:	3P Hours per Week
Duration of SEE	3 Hours
SEE:	50 Marks
CIE	50 Marks
Credits:	1.5

Course Objectives

1. To impart fundamental knowledge in handling the equipment / glassware and chemicals in chemistry laboratory.
2. To provide the knowledge in both qualitative and quantitative chemical analysis
3. The student should be conversant with the principles of volumetric analysis
4. To apply various instrumental methods to analyse the chemical compounds and to improve understanding of theoretical concepts.
5. To interpret the theoretical concepts in the preparation of new materials like drugs and polymers.

Course Outcomes

At the end of the course student will be able to:

1. Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.
2. Estimate the amount of chemical substances by volumetric analysis.
3. Determine the rate constants of reactions from concentration of reactants/ products as a function of time.
4. Calculate the concentration and amount of various substances using instrumental techniques.
5. Develop the basic drug molecules and polymeric compounds.

Chemistry Lab

1. Introduction: Preparation of standard solution of oxalic acid and standardisation of NaOH.
2. Estimation of metal ions (Co^{+2}& Ni^{+2}) by EDTA method.
3. Estimation of temporary and permanent hardness of water using EDTA solution
4. Determination of Alkalinity of water
5. Determination of rate constant for the reaction of hydrolysis of methyl acetate. (first order)
6. Determination of rate constant for the reaction between potassium per sulphate and potassium Iodide. (second order)
7. Estimation of amount of HCl Conductometrically using NaOH solution.
8. Estimation of amount of HCl and CH_3COOH present in the given mixture of acids Conductometrically using NaOH solution.
9. Estimation of amount of HCl Potentiometrically using NaOH solution.
10. Estimation of amount of Fe^{+2} Potentiometrically using $KMnO_4$ solution
11. Preparation of Nitrobenzene from Benzene.
12. Synthesis of Aspirin drug and Paracetamol drug.
13. Synthesis of phenol formaldehyde resin.

Text Books:

1. J. Mendham and Thomas , "Vogel's text book of quantitative chemical analysis", Pearson education Pvt.Ltd. New Delhi ,6th ed. 2002.
2. Senior practical physical chemistry by B.D.Khosla, V.C.Garg&A.Gulati,; R. Chand & Co. : New Delhi (2011).

Suggested Readings:

1. Dr.Subdharani , "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing, 2012.
2. S.S. Dara , "A Textbook on experiment and calculation in engineering chemistry", S.Chand and Company, 9th revised edition, 2015.

With effect from the Academic Year 2022-23

22MBC02

COMMUNITY ENGAGEMENT

Instruction	3P Hours per week
SEE	Nil
CIE	50 Marks
Credits	1.5

Course Objectives: The main Objectives of this Course are to:

1. Develop an appreciation of Rural culture, life-style and wisdom among the Students.
2. Learn about the various livelihood activities that contribute to Rural economy.
3. Familiarize the Rural Institutions and the Rural Development Programmes in India.

Course Outcomes: After the completion of this Course, Student will be able to:

2. Gain an understanding of Rural life, Culture and Social realities.
3. Develop a sense of empathy and bonds of mutuality with Local Communities.
4. Appreciate significant contributions of Local communities to Indian Society and Economy.
5. Exhibit the knowledge of Rural Institutions and contributing to Community's Socio-Economic improvements.
6. Utilise the opportunities provided by Rural Development Programmes.

Module IAppreciation of Rural Society

Rural life style, Rural society, Caste and Gender relations, Rural values with respect to Community, Nature and Resources, elaboration of 'soul of India lies in villages' (Gandhi), Rural Infrastructure.

Module II Understanding Rural Economy and Livelihood

Agriculture, Farming, Landownership, Water management, Animal Husbandry, Non-farm Livelihood and Artisans, Rural Entrepreneurs, Rural markets, Rural Credit Societies, Farmer Production Organization/Company.

ModuleIII Rural Institutions

Traditional Rural organizations, Self-Help Groups, Panchayati Raj Institutions (Gram Sabha), Gram Panchayat, Standing Committees, Local Civil Society, Local Administration.

ModuleIV Rural Development Programmes

History of Rural Development in India, Current National Programmes: SarvaShiksha Abhiyan, BetiBhachao, BetiPadhao, Ayushman, Bharat, Swachh Bharat, PM Awas Yojana, Skill India, Gram Panchayat Decentralised Planning, NRLM, MNREGA etc.

Text Books:

1. Singh, Katar, Rural Development: Principles, Policies and Management, Sage Publications, New Delhi, 2015.
2. A Hand book on Village Panchayat Administration, Rajiv Gandhi Chair for Panchayati Raj Studies, 2002.
3. United Nations, Sustainable Development Goals, 2015, un.org/sdgs
4. M.P Boraia, Best Practices in Rural Development, Shanlax Publishers, 2016.

Journals:

1. Journal of Rural development (published by NIRD & PR, Hyderabad).
2. Indian Journal of Social Work, (by TISS, Bombay).
3. Indian Journal of Extension Educations (by Indian Society of Extension Education).
4. Journal of Extension Education (by Extension Education Society).
5. Kurukshetra (Ministry of Rural Development, GOI).
6. Yojana (Ministry of Information & Broadcasting, GOI).

With effect from the Academic Year 2022-23

22CSC04

OBJECT-ORIENTED PROGRAMMING LAB

Instruction	2P Hours per week
Duration of SEE	3 Hours
SEE	50 Marks
CIE	50 Marks
Credits	1

Course Objectives: The objectives of this course are to:

1. Master the concepts of Object Oriented Programming.
2. Explore the OOPs features of Python and build applications.

Course Outcomes: After completion of course, students would be able to:

1. Demonstrate the features of Object-Oriented Programming.
2. Understand APIs and third-party libraries to be used with Python.
3. Use Python libraries to solve real-world problems.
4. Write scripts to solve data science/machine leaning problems using NumPy and Pandas.
5. Develop applications by accessing web data and databases.

Laboratory / Practical:

1. Write a NumPy program to compute the cross product of two given vectors.
2. Write NumPy program to calculate the QR decomposition of a given matrix.
3. Write a Pandas program to convert a Panda Module Series to Python list and its type.
4. Write a Pandas program to convert a NumPy array to a Pandas series.
5. Create a Python project to get the citation from Google scholar using title and year of publication and volume and pages of journal.
6. Create a Python project to get total COVID-19 cases, total deaths due to COVID-19, total COVID-19 patients recovered in the world.

Text Book:

1. Reema Thareja, "Python Programming", Oxford Press, 2017.

Online Resources:

1. https://vknight.org/cfm/labsheets/04-object-oriented-programming/
2. http://learning-python.com/class/Workbook/x-exercises.htm
3. https://inst.eecs.berkeley.edu/~cs61a/fa14/lab/lab06/#inheritance
4. https://anandology.com/python-practice-book/object_oriented_programming.html
5. http://stanfordpython.com/
6. https://docs.python.org/3/

With effect from the Academic Year 2022–23

22 MEC37

ROBOTICS AND DRONES LAB

(Common to All Branches)

Instruction	2T + 2P Hours per week
CIE	100
Credits	3

Objectives: The objectives of this course are to:

1. To develop the students' knowledge in various robot and drone structures and their workspace.
2. To develop multidisciplinary robotics that have practical importance by participating in robotics competitions
3. To develop students' skills in performing spatial transformations associated with rigid body motions, kinematic and dynamatic analysis of robot systems.
4. Through projects done in lab, increase the true hands-on student learning experience and enhance their conceptual understanding, increase students' ability, competence and teamwork skills on dealing with real-life engineering problems

Outcomes: After completion of course, students would be able to:

1. Demonstrate knowledge of the relationship between mechanical structures of robotics and their operational workspace characteristics
2. Understand mechanical components, motors, sensors and electronic circuits of robots and build robots.
3. Demonstrate knowledge of robot controllers.
4. Use Linux environment for robotic programming.
5. Write Python scripts to control robots using Python and Open CV.

Lab Experiments:

1. Assembling of robot mechanical components, mounting of motors, sensors, electronic circuits to the chassis.
2. Connecting to electronic circuitry: motor drivers, incremental encoders proximity sensors, micro controller,
3. Different types of batteries, selection of suitable battery for application, safety precaution.
4. Introduction to Linux Command Line Interface: basic file and directory management and other useful commands
5. Controlling robot using Python: i) Move robot using Python code, ii) Make robot move in patterns using Python
6. Robot programming with Sensor inputs:i) Read sensor data using Python, ii) Visualize sensor data using Python, iii) Code robot to avoid obstacles by using sensor data
7. Open CV: i) Create an Image and display an image; ii) Read and change pixel values; iii) Create colored shapes and save image; iv) Extract the RGB values of a pixel; v) Reading and Writing Videos
8. Open CV: i) Extraction of Regions of Interest; ii) Extraction of RGB values of a pixel
9. Coding robot to work with colors, follow colored objects, identifying shape of the object-oriented
10. Projects: i)Making a line follower robot using a Camera; ii) Writing code for a complex function
11. Assembly of a drone

Suggested readings

1. https://www.geeksforgeeks.org/robotics-introduction/
2. https://www.ohio.edu/mechanical-faculty/williams/html/PDF/IntroRob.pdf
3. https://www.idtechex.com/en/research-report/new-robotics-and-drones-2018-2038-technologies-forecasts-players/584
4. https://dronebotworkshop.com/

With effect from the Academic Year 2022-2**023**

22EEC02

BASIC ELECTRICAL ENGINEERING LAB

Instruction	2P Hours per week
Duration of Semester End Examination	3 Hours
Semester End Examination	50 Marks
CIE	50 Marks
Credits	1

Course Objectives:

1. To acquire the knowledge on different types of electrical elements and to verify the basic electrical circuit laws and theorems.
2. To determine the parameters and power factor of a coil, calculate the time and frequency responses of RLC circuits and to familiarize with measurement of electric power & energy.
3. To determine the characteristics of Transformers, dc, ac machines and switch gear components

Course Outcomes: At the end of the course, the students are expected to

1. Comprehend the circuit analysis techniques using various circuital laws and theorems.
2. Analyse the parameters of the given coil and measurement of power and energy in AC circuits
3. Determine the turns ration/performance parameters of single-phase transformer
4. Infer the characteristics of DC shunt motor different tests.
5. Illustrate different parts and their function of electrical components, equipment and machines.

List of Laboratory Experiments/Demonstrations:

1. Verification of KCL and KVL.
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Charging and discharging of Capacitor.
5. Determination of parameters of a choke or coil by Wattmeter Method.
6. Power factor improvement of single-phase AC System.
7. Active and Reactive Power measurement of a single-phase system using
   (i) 3-Ammeter method (ii) 3-Voltmeter method
8. Measurement of 3-Phase Power in a balanced system
9. Calibration of single-phase energy meter.
10. Verification of Turns/voltage ratio of single-phase Transformer.
11. Open Circuit and Short Circuit tests on a given single phase Transformer
12. Brake test on DC Shunt Motor
13. Speed control of DC Shunt Motor
14. Demonstration of Measuring Instruments and Electrical Lab components.
15. Demonstration of Low-Tension Switchgear Equipment/Components
16. Demonstration of cut - out section of Machines like DC Machine, Induction Machine etc.

Note: TEN experiments to be conducted to cover all five Course Outcomes.