CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
Inline with AICTE Model Curriculum with effect from AY 2022-23

DEPARTMENT OF INFORMATION TECHNOLOGY

SEMESTER – I

S. No.	Course Code	Title of the Course	Category	L	T	P	Credits	CIE	SEE	Total
				Hours per Week				**Assessment Marks**		
THEORY										
1	22MTC01	Linear Algebra & Calculus	BSc	3	1	0	4	40	60	100
2	22PYC01	Optics and Semiconductor Physics	BSc	3	0	0	3	40	60	100
3	22CSC01	Problem Solving and Programming	ESc	2	1	0	3	40	60	100
4	22EGC01	English	HSS	2	0	0	2	40	60	100
PRACTICALS										
5	22PYC03	Optics and Semiconductor Physics Lab	BSc	0	0	3	1.5	50	50	100
6	22EGC02	English lab	HSS	0	0	2	1	50	50	100
7	22CSC02	Problem Solving And Programming Lab	ESc	0	0	3	1.5	50	50	100
8	22MEC01	CAD and Drafting	ESc	0	1	3	2.5	50	50	100
9	22MEC38	Digital Fabrication Lab	ESc	0	0	3	1.5	50	50	100
	Total			10	3	14	20	410	490	900

L: Lecture   D: Drawing   **CIE: Continuous Internal Evaluation**

T: Tutorial   P: Practical/Project Seminar/Dissertation   SEE: Semester End Examination

Head Dept. of IT
CBIT, Hyderabad

22MTC01

LINEAR ALGEBRA & CALCULUS
(IT)

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

COURSE OBJECTIVES: This course aims to
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: After completion of 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

CO-PO ARTICULATION MATRIX

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	3	3	-	-	-	-	-	-	-	2
CO 2	3	3	3	3	-	-	-	-	-	-	-	2
CO 3	3	3	3	3	-	-	-	-	-	-	-	2
CO 4	3	3	3	3	-	-	-	-	-	-	-	1
CO 5	3	3	3	3	-	-	-	-	-	-	-	1

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, 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", 44th Edition, KhannaPublishers, 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.

Head Dept. of IT
CBIT, Hyderabad

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: This course aims to
1. Understand the fundamentals of wave nature of light
2. Acquire knowledge of lasers, holography and fiber optics
3. Familiarize with quantum mechanics
4. Learn the fundamental concepts of solids

COURSE OUTCOMES: After completion of this course, students 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

CO-PO ARTICULATION MATRIX

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	3	2	2	2	1	1	2	1	2
CO2	3	3	3	3	3	3	3	3	2	2	3	2
CO3	3	3	3	3	3	2	3	2	1	2	1	2
CO4	2	2	2	1	2	2	2	2	1	2	2	2
CO5	3	2	2	2	2	2	3	3	2	2	3	2

UNIT-I
Wave Optics: Huygen's principle –Super position 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 – Fiberlosses--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 Kiruthiga Sivaprasath, *Modern Physics*, S. Chand Publications, 2014.
2. V. Rajendran, *Engineering Physics*, Mc Graw-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.

Head Dept. of IT
CBIT, Hyderabad

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: This course aims 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 this course, students will 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.

CO-PO ARTICULATION MATRIX

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	1	1	-	1	-	-	-	-	-	-	1
CO2	3	1	1	-	1	-	-	-	-	-	-	1
CO3	3	1	1	-	1	-	-	-	-	-	-	1
CO4	3	1	1	-	1	-	-	-	-	-	-	1
CO5	3	1	1	-	1	-	-	-	-	-	-	1
CO6	3	1	1	-	1	-	-	-	-	-	-	1

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.

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.

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.

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.

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, "Programming for Problem Solving", First Edition, Khanna Book Publishing Co., Delhi.
2. Jeeva Jose, "Taming Python by Programming", Revised Edition, Khanna 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 Eric Matthes, No Starch Press.
5. "Programming in Python", R.S. Salaria, Khanna Book Publishing Co., Delhi.

NPTEL/SWAYAM COURSES:

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.
3. https://www.coursera.org/specializations/python-3-programming

Head Dept. of IT
CBIT, Hyderabad

22EGC01

Instruction	2 L Hours per Week
Duration of Semester End Examination	3 Hours
Semester End Examination	60 Marks
CIE	40 Marks
Credits	2

PREREQUISITE: Basic knowledge of English grammar and vocabulary.

COURSE OBJECTIVES: This course aims to
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 completion of this course, 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.

CO-PO-PSO ARTICULATION MATRIX

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	1	1	1	1	1	1	1	2	3	3	2	3
CO 2	1	1	1	1	-	1	1	1	2	2	1	2
CO 3	-	2	1	1	-	2	1	1	2	2	1	2
CO 4	1	2	1	2	1	2	2	1	2	2	1	2
CO 5	1	2	1	2	1	1	1	1	1	2	1	2

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.

Head Dept. of IT
CBIT, Hyderabad

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, 2018th Edition, Orient Black Swan, 2018.
2. Swan Michael, "Practical English Usage", OUP, 1995.

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

Head Dept. of IT
CBIT, Hyderabad

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: This course aims to
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: After completion of this course, students 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 of thermistor

CO-PO ARTICULATION MATRIX

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	3	2	2	3	1	3	1	3	3	2	1	2
C02	3	2	1	2	2	2	1	2	2	1	1	3
C03	3	2	3	2	3	1	2	2	3	2	1	2
C04	3	3	2	2	2	1	2	3	2	1	1	3
C05	3	1	2	3	2	1	1	2	2	2	1	2

LIST OF 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 radius of curvature of a given plano-convex lens using Na vapor lamp
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.   : 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.   : Determination of temperature coefficient of resistance of given thermistor
12. Hall Effect   : Determination of Hall coefficient, carrier concentration and mobility ofcharge 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.

22EGC02

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

PREREQUISITE: Basic Knowledge of English Communication.

COURSE OBJECTIVES: This course aims to
1. To nuances of Phonetics and give them sufficient practice in correct pronunciation.
2. To word stress and intonation.
3. To IELTS and TOEFL 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 behaviour while developing their ability to discuss in groups and making oral presentations.

COURSE OUTCOMES: After completion of this course, 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 IELTS and TOEFL 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.

CO-PO-PSO ARTICULATION MATRIX

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	-	-	-	-	-	-	-	-	1	1	-	1
CO 2	-	-	-	-	-	1	-	1	2	2	1	2
CO 3	-	-	-	-	-	1	1	1	2	1	1	2
CO 4	1	-	-	-	-	1	2	2	2	3	1	3
CO 5	1	1	1	1	1	2	2	2	3	3	2	3

LIST OF 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 IELTS and TOEFL material.
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 e presentation.

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. Priyadarshi Patnaik, "Group Discussions and Interviews", Cambridge University Press Pvt. Ltd., 2011.
4. Aruna Koneru, "Professional Speaking Skills", Oxford University Press, 2016.

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: This course aims to
1. Master the fundamentals of writing Python scrips.
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 this course, students will 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.

CO-PO ARTICULATION MATRIX

PO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	2	1	-	-	-	-	-	-	-	-	1
CO2	3	3	2	2	3	-	-	-	-	-	-	1
CO3	2	3	3	2	3	-	-	-	-	-	-	1
CO4	2	3	3	2	2	-	-	-	-	-	-	1
CO5	2	3	3	3	3	-	-	-	-	-	-	1
CO6	2	3	3	3	3	-	-	-	-	-	-	1

LA

1. Explore various Python Program Development Environments.
2. Demonstration of input/output operations.
3. Demonstration of operators.

5. Demonstration of looping control structures.
6. Demonstration of List, Tuple and Set
7. Demonstration of Python Dictionaries.
8. Implementation of searching and sorting techniques.
9. Implementation of string manipulation operations.
10. File handling and memory management operations.

TEXT BOOKS AND REFERENCES:
1. R.S. Salaria, "Programming for Problem Solving", First Edition, Khanna Book Publishing Co., Delhi.
2. Jeeva Jose, "Taming Python by Programming", Revised Edition, Khanna 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 Eric Matthes, No Starch Press.
5. "Programming in Python", R.S. Salaria, Khanna Book Publishing Co., Delhi.

NPTEL/SWAYAM Courses:
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.
3. https://www.coursera.org/specializations/python-3-programming.

Head Dept. of IT
CBIT, Hyderabad

22MEC01

CAD AND DRAFTING

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

COURSE OBJECTIVES: This course aims to
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.

COURSE OUTCOMES: After completion of this course, students will be 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

CO-PO ARTICULATION MATRIX

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	2	2	-	1	2	3	1	3
CO2	3	2	2	1	2	2	-	1	2	2	1	2
CO3	3	3	2	1	2	2	-	1	2	2	1	2
CO4	3	3	3	2	2	2	-	1	2	2	1	2
CO5	3	2	2	1	2	2	-	1	2	2	1	2

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.

22MEC38

DIGITAL FABRICATION LAB

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

COURSE OBJECTIVES: This course aims 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.

COURSE OUTCOMES: After completion of this course, students will be able to
1. Understand safety measures to be followed in workshop to avoid accidents.
2. Identify various tools used in carpentry, house wiring and plumbing.
3. Make a given model by using workshop trades like carpentry, plumbing, House wiring and 3d modeling using solid works software for Additive Manufacturing.
4. Perform pre-processing operations on STL files for 3D printing, also understand reverse engineering process.
5. Conceptualize and produce simple device/mechanism of their choice.

CO-PO ARTICULATION MATRIX

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	-	-	-	1
CO2	1	-	-	-	1	-	-	-	-	-	-	2
CO3	2	1	1	1	3	-	1	-	-	-	-	2
CO4	2	2	2	1	3	-	-	-	-	-	-	2
CO5	3	2	1	-	3	-	-	-	-	-	-	2

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.
a. A. To connect the GI pipes as per the given diagram using, couplings, unions, reducer & bends.
b. 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

Head Dept. of IT
CBIT, Hyderabad

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)
Inline with AICTE Model Curriculum with effect from AY 2022-23

DEPARTMENT OF INFORMATION TECHNOLOGY

SEMESTER – II

S. No.	Course Code	Title of the Course	Category	Hours per Week			Credits	Assessment Marks		
				L	T	P		CIE	SEE	Total
THEORY										
1	22MTC04	Differential Equations & Numerical Methods	BSc	3	1	0	4	40	60	100
2	22CYC01	Chemistry	BSc	3	0	0	3	40	60	100
3	22EEC01	Basic Electrical Engineering	ESc	2	1	0	3	40	60	100
4	22CSC03	Object Oriented Programming	ESc	2	1	0	3	40	60	100
PRACTICALS										
5	22CYC02	Chemistry Lab	BSc	0	0	3	1.5	50	50	100
6	22MBC02	Community Engagement	HSS	0	0	3	1.5	50	-	50
7	22CSC04	Object Oriented Programming Lab	ESc	0	0	2	1	50	50	100
8	22MEC37	Robotics and Drones Lab	ESc	0	2	2	3	100	-	100
9	22EEC02	Basic Electrical Engineering Lab	ESc	0	0	2	1	50	50	100
Total				**10**	**5**	**12**	**21**	**460**	**390**	**850**

L: Lecture   D: Drawing   **CIE: Continuous Internal Evaluation**
T: Tutorial   P: Practical/Project Seminar/Dissertation   **SEE: Semester End Examination**

22MTC04

DIFFERENTIAL EQUATIONS & NUMERICAL METHODS
(IT)

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

COURSE OBJECTIVES: This course aims to
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: After completion of 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.

CO-PO ARTICULATION MATRIX

PO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3	3	3	-	-	-	-	-	-	-	2
CO 2	3	3	3	3	-	-	-	-	-	-	-	2
CO 3	2	2	2	2	-	-	-	-	-	-	-	1
CO 4	2	2	2	2	-	-	-	-	-	-	-	1
CO 5	1	1	1	1	-	-	-	-	-	-	-	1

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**.**

Head Dept. of IT
CBIT, Hyderabad

UNIT-V

onvergence 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", 44th Edition, Khanna Publishers, 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", 5th edition, Narosa Publications, 2016.
2. Ramana B.V, "Higher Engineering Mathematics", 11th Reprint, Tata McGraw Hill New Delhi, 2010.
3. A.R.Vasishtha and R.K.Guptha, "Integral Transforms", Reprint, Krishna's Educational Publishers, 2014.

Head Dept. of IT
CBIT, Hyderabad

22CYC01

CHEMISTRY
(COMMON TO CSE, CSE-AIML, AIML, CSE-IOT, AIDS)

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

COURSE OBJECTIVES: This course aims to
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: After completion of this course, students 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.

CO-PO ARTICULATION MATRIX

PO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	-	-	2	2	-	-	-	-	2
CO 2	3	2	2	-	-	2	2	-	-	-	-	2
CO 3	3	2	3	-	-	2	2	-	-	-	-	2
CO 4	3	2	3	-	-	2	2	-	-	-	-	2
CO 5	3	2	2	-	-	2	2	-	-	-	-	2

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, and – 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 READING:

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., 46th edition (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).

Head Dept. of IT
CBIT, Hyderabad

22EEC01

BASIC ELECTRICAL ENGINEERING

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

COURSE OBJECTIVES: This course aims to
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 completion of this course, students 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.

CO-PO ARTICULATION MATRIX

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO-1	3	3	2	-	-	-	-	-	1	2	-	3
CO-2	3	3	2	-	-	-	-	-	1	2	-	3
CO-3	3	3	2	1	-	-	-	-	1	2	-	3
CO-4	2	1	-	-	-	-	-	-	1	2	-	3
CO-5	2	-	2	-	-	-	-	-	1	2	-	3

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

Head Dept. of IT
CBIT, Hyderabad

UNIT-V

Electrical Installations: Electrical Wiring: Types of wires and cables, Electrical Safety precautions in handling electrical appliances, electric shock, and 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, 2013

Head Dept. of IT
CBIT, Hyderabad

22CSC03

<div align="center">

OBJECT ORIENTED PROGRAMMING

</div>

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

COURSE OBJECTIVES: This course aims 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 this course, students will 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.

<div align="center">

CO-PO ARTICULATION MATRIX

</div>

PO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1	3	1	2	-	1	-	-	-	-	-	-	1
2	3	1	3	2	2	-	-	-	-	-	-	2
3	3	1	2	1	1	-	-	-	-	-	-	1
4	3	2	3	1	2	-	-	-	-	-	-	2
5	3	2	3	1	2	-	-	-	-	-	-	2

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 functions, Memory allocation for classes and objects, arrays of objects, constructors.

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.

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

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

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", 6th Edition, Khanna Book Publishing Co., Delhi.
3. Jeeva Jose, "Introduction to Computing & Problem Solving with Python", First Edition, Khanna Book Publishing, 2019.
4. Paul Barry, "Head First Python", O'Reilly, 2010.

Head Dept. of IT
CBIT, Hyderabad

NPTEL/SWAYAM Courses:
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.
3. https://www.coursera.org/specializations/python-3-programming#courses.

22CYC02

    B

(IT)

Instruction:	3P Hours per Week
Duration of Semester End Examination:	3 Hours
Semester End Examination:	50 Marks
Continuous Internal Evaluation:	50 Marks
Credits:	1.5

COURSE OBJECTIVES: This course aims to
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 theorical 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.

CO-PO ARTICULATION MATRIX

PO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	2	-	-	2	2	-	-	-	-	2
CO 2	3	2	1	-	-	1	2	-	-	-	-	2
CO 3	3	2	3	-	-	2	2	-	-	-	-	2
CO 4	3	2	2	-	-	2	2	-	-	-	-	2
CO 5	3	2	3	-	-	2	2	-	-	-	-	2

LIST OF EXPERIMENTS:
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.

Head Dept. of IT
CBIT, Hyderabad

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.

Head Dept. of IT
CBIT, Hyderabad

22MBC02

COMMUNITY ENGAGEMENT

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

COURSE OBJECTIVES: This course aims 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 completion of this course, students will be able to
1. Gain an understanding of Rural life, Culture and Social realities.
2. Develop a sense of empathy and bonds of mutuality with Local Communities.
3. Appreciate significant contributions of Local communities to Indian Society and Economy.
4. Exhibit the knowledge of Rural Institutions and contributing to Community's Socio Economic improvements.
5. Utilise the opportunities provided by Rural Development Programmes.

Module I
Appreciation 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.

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

Module IV
Rural Development Programmes
History of Rural Development in India, Current National Programmes: Sarva Shiksha Abhiyan, Beti Bhachao, Beti Padhao, 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).

Head Dept. of IT
CBIT, Hyderabad

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: This course aims to
1. Master the concepts of Object Oriented Programming.
2. Explore the OOPs features of Python and build applications.

COURSE OUTCOMES: After completion of this course, students will 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.

CO-PO ARTICULATION MATRIX

PO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
1	3	2	3	1	3	-	-	-	-	-	-	2
2	3	3	2	2	2	-	-	-	-	-	-	2
3	3	3	3	2	3	-	-	-	-	-	-	2
4	3	3	3	3	3	-	-	-	-	-	-	2
5	3	3	3	3	3	-	-	-	-	-	-	2

LIST OF EXPERIMENTS:
1. Demonstration of classes and objects with referencing the class variables, instance variables and static
2. Demonstration of Inheritance types with constructor and destructor invocation in inheritance.
3. Demonstration of Exception handling and unit testing.
4. Write a NumPy program to compute the cross product of two given vectors.
5. Write NumPy program to calculate the QR decomposition of a given matrix.
6. Write a Pandas program to convert a Panda Module Series to Python list and its type.
7. Write a Pandas program to convert a NumPy array to a Pandas series.
8. Create a Python project to get the citation from Google scholar using title and year of publication and volume and pages of journal.
9. Create a Python project to get total COVID-19 cases, total deaths due to Covid-19, total Covid-19 patients
10. Demonstration of database connectivity and different types of JOIN operations on tables.
Note: Programs need to be on OOPS concepts.

TEXT BOOK:
1. Reema Thareja, "Python Programming", First Edition, 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/

Head Dept. of IT
CBIT, Hyderabad

22MEC37

ROBOTICS AND DRONES LAB
(Common to All Branches)

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

COURSE OBJECTIVES: This course aims 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 dynamitic 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

COURSE OUTCOMES: After completion of this course, students will 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.

COURSE ARTICULATION MATRIX

PO#/ CO#	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	P0 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	1	2	1	1	1	2	2	2	3	2	1
CO2	2	3	1	2	3	1	1	1	1	2	2	1	2	1	1
CO3	2	2	2	2	2	1	1	1	1	2	2	2	3	2	3
CO4	2	2	1	2	2	2	1	1	1	2	2	2	2	2	3
CO5	1	1	1	1	1	3	3	3	1	3	3	3	1	1	3

Lab Experiments:
1. Assembling of robot mechanical components, mounting of motors, sensors, electronic circuits to the
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
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

Head Dept. of IT
CBIT, Hyderabad

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/

Head Dept. of IT
CBIT, Hyderabad

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: This course aims to

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: After completion of this course, students will be able 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.

CO-PO Matrix

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	2	2	-	-	2	2	-	-	-	-	2	-	-	-
CO 2	3	2	1	-	-	1	2	-	-	-	-	2	-	-	-
CO 3	3	2	3	-	-	2	2	-	-	-	-	2	-	-	-
CO 4	3	2	2	-	-	2	2	-	-	-	-	2	-	-	-
CO 5	3	2	3	-	-	2	2	-	-	-	-	2	-	-	-

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
             .
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 Outcom

SCHEME OF INSTRUCTION AND SYLLABI

of

BE V to VI SEMESTERS

of

FOUR YEAR DEGREE COURSE

in

B.E. – INFORMATION TECHNOLOGY
(AICTE Model Curriculum with effect from AY 2020-21)

R-20 Regulation

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

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 Information Technology.
- To collaborate with industries and research organizations and excel in the emerging areas of research.
- To imbibe social responsibility in students.
- 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.

Head Dept. of IT
CBIT, Hyderabad

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 which focuses 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.

Head Dept. of IT
CBIT, Hyderabad

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

Scheme of Instruction of V Semester of B.E. – Information Technology
as per AICTE Model Curriculum, w.e.f: 2022-23

DEPARTMENT OF INFORMATION TECHNOLOGY

SEMESTER -V

S.No	Course Code	Title of the Course	Scheme of Instruction Hours per week		Duration of SEE in Hours	Maximum Marks		Credits
			L/T	P/D		CIE	SEE	
THEORY								
1	20ITC19	Operating Systems	3	-	3	40	60	3
2	20ITC20	Computer Networks	3	-	3	40	60	3
3	20ITC21	Basic Machine Learning	3	-	3	40	60	3
4	20ADC07	Full Stack Development	3	-	3	40	60	3
5		Professional Elective - 2	3	-	3	40	60	3
PRACTICALS								
6	20ITC22	Networks and Security Lab	-	3	3	50	50	1.5
7	20ITC23	Basic Machine Learning Lab	-	3	3	50	50	1.5
8	20ADC09	Minor Project-I (Full Stack Development Lab)	-	3	-	50	-	1.5
9	20ITI02	Industrial / Rural Internship-II	90 Hours		-	-	-	2
	TOTAL		**15**	**9**		**350**	**400**	**21.5**

L: Lecture   **T: Tutorial**   **D: Drawing**   **P: Practical**
CIE - Continuous Internal Evaluation   **SEE - Semester End Examination**

Professional Elective-2		
S.No.	Course Code	Course Name
1.	20ITE05	Information Retrieval Systems
2.	20ITE06	Advanced Databases
3.	20ITE07	Augmented Reality and Virtual Reality

Head Dept. of IT
CBIT, Hyderabad

| 4. | 20ITE08 | Cyber Security |
| 5. | 20ITE09 | Software Project Management |

Head Dept. of IT
CBIT, Hyderabad

20ITC19   OPERATING SYSTEMS

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

Course Objectives:
1. To familiarize students with various services provided by an operating system.
2. To introduce the concepts of process, process synchronization and process scheduling.
3. To deal with different approaches of memory management.
4. To facilitate understanding of the structure and organization of the file system.
5. To provide understanding of Protection and security aspects of operating systems

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Demonstrate operating system services, inter process communication and multithreaded Programming.
2. Apply suitable process scheduling, deadlocks handling algorithms and solve process-synchronization.
3. Make use of advanced techniques such as paging, segmentation and virtual memory for memory management.
4. Illustrate file system interfaces and its implementation.
5. Identify the Operating System Security problems and Threats.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	1	1	-	-	-	1	1	1	1	3	3	3
CO2	2	1	2	1	2	-	-	-	-	-	1	-	3	-	2
CO3	2	1	2	2	1	-	-	-	-	-	-	-	3	-	3
CO4	2	1	1	1	1	-	-	-	-	-	-	1	3	-	1
CO5	2	1	1	1	1	-	-	-	-	-	-	1	3	-	1

UNIT–I
Introduction: Definition of Operating System, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Computing Environments, Open-Source Operating Systems.

Operating System Structures: Operating-System Services, User and Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating-System Structure, System Boot.

Process: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication.

Threads: Overview, Multicore Programming, Multithreading Models, Threading Issues.

UNIT–II
Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling.

Synchronization: Background, The Critical-Section Problem, Peterson 's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors.

Head Dept. of IT
CBIT, Hyderabad

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT–III
Memory Management Strategies: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

Virtual Memory Management: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory.

UNIT–IV
File-System: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing Protection.

Implementing File Systems: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance.

Mass-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap-Space Management.

UNIT–V
System Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of the Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems **System Security:** The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication.

Text Book:
1. Abraham Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley and Sons Pvt Ltd, 2018.

Suggested Reading:
1. A.Tanenbaum, "Modern Operation Systems", 3rd Edition, Pearson Education, 2008.
2. William Stallings, "Operating Systems", 5th Edition, Pearson Education, 2005.
3. Ida M.Flynn, "Understanding Operating Systems", 6th Edition, Cengage, 2011.
4. D.M.Dhamdhere, "Operating systems a concept-based approach", 2nd Edition, McGraw-Hill, 2007.

Web Resources:
1. https://www.os-book.com/OS10/
2. http://nptel.ac.in/downloads/106108101/
3. http://www2.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/
4. http://www.cs.kent.edu/~farrell/osf03/oldnotes/

Head Dept. of IT
CBIT, Hyderabad

20ITC20   COMPUTER NETWORKS

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

Course Objectives:

1. Familiarize students with the basics of Layering of services, data transmission, transmission media, data Communication System and its components.
2. Provide state-of-the-art knowledge on Network Layer issues including Routing, Addressing.
3. Give an overview of how Networks differ and how they can be interconnected.
4. Introduce IP based transport protocols TCP and UDP.
5. Give an insight into the working principles of popular Internet Applications including Email, Domain Name System, WWW, Streaming audio and video.

Course Outcomes:

Upon successful completion of this course, students will be able to

1. Summarize functions of each layer in the OSI and TCP/IP reference models and demonstrate the systematic understanding of data communication Techniques.
2. Solve problems related to Addressing, Routing and Interoperability among heterogeneous networks.
3. Identify issues in Internetwork Routing issues and Congestion in computer networks.
4. Appraise the functions and performance of Internet Transport Protocols TCP and UDP.
5. Analyze the operating principles of Domain Name System and Electronic Mail, WWW.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	-	-	-	-	-	-	2	3	3	3
CO2	3	3	2	1	-	-	-	-	-	-	-	2	3	3	2
CO3	3	3	2	1	-	-	-	-	-	-	-	2	3	3	3
CO4	3	3	2	2	-	-	-	-	-	-	-	2	3	3	2
CO5	3	3	2	2	-	-	-	-	-	-	-	2	3	3	3

UNIT-I
Introduction: Concept of layering, Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models, **The Data Link Layer**: Framing, Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Sliding Window Protocols. **Channel allocation methods:** Assumptions for dynamic channel allocation, Carrier Sense Multiple access protocols, Collision free protocols. **Ethernet:** MAC Sublayer Protocol, Switched Ethernet, Fast Ethernet, Gigabit Ethernet, 10-Gigabit Ethernet.

UNIT-II
Network layer Routing Algorithms: Design Issues, Routing Algorithms-Shortest path, Flooding, Flow based Distance vector, Link state Routing.

6

Head Dept. of IT
CBIT, Hyderabad

The Network Layer in The Internet: IP Version 4 Protocol, IP Addresses, IP Version 6, Internet Control Protocols, Label Switching and MPLS, Internet Multicasting, **Internetworking:** Different networks, Connection of networks, Tunneling, Packet Fragmentation.

UNIT-III
The Transport Layer: Berkeley Sockets, Elements of transport protocols – Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Multiplexing, Crash Recovery.
Congestion Control: Desirable Bandwidth Allocation, Regulating the Sending Rate.

UNIT-IV
-Introduction to UDP.
The Internet Transport Protocols: TCP- Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, TCP Connection Management Modeling, TCP Sliding Window, TCP Timer Management, TCP Congestion Control.

UNIT-V
Application Layer: DNS—The Domain Name System, The DNS Name Space, Domain Resource Records, Name Servers. **Electronic MAIL:** Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery. **The World Wide Web** - Architectural Overview. **Streaming Audio and Video:** Streaming Stored Media, Streaming Live Media. Content Delivery.

Text Books:
1. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks", 5th Edition, Pearson Education, 2014.
2. W. Richard Stevens, "Unix Network Programming", Prentice Hall/Pearson Education, 2009.

Suggested Reading:
1. Chwan-Hwa (John) Wu, J. David Irwin, "Introduction to Computer Networks and Cyber Security", CRC Press, 2013.
2. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", 5th Edition, Addison-Wesley, 2012.

Web Resources:
1. https://nptel.ac.in/courses/117105148
2. https://www.ibm.com/docs/en/i/7.1?topic=communications-socket-programming

Head Dept. of IT
CBIT, Hyderabad

20ITC21   BASIC MACHINE LEARNING

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

Course Objectives:
1. To impart knowledge on the basic concepts of machine learning.
2. To familiarize different machine learning techniques.
3. To learn various Classification and Regression algorithms.
4. To familiarize various Kernels, SVMs and Ensemble methods.
5. To facilitate Dimensionality Reduction and Clustering.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Explain the types of machine learning and handle the challenges of machine learning.
2. Construct Decision Trees, Measure performance of classifiers.
3. Apply Regression, Logistic Regression and gradient descent to solve problems.
4. Design solutions using Bayesian classifier, SVMs and Ensemble methods.
5. Perform Dimensionality reduction and clustering of data.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	2	-	-	-	-	-	-	-	1	-	-	-
CO2	1	1	1	1	-	-	-	-	-	-	-	1	2	3	2
CO3	2	2	1	2	1	-	-	-	-	-	1	1	2	3	2
CO4	2	2	1	2	1	-	-	-	-	-	1	1	2	3	2
CO5	2	2	1	2	1	-	-	-	-	-	1	1	2	3	2

UNIT-I
The Machine Learning Landscape: What Is Machine Learning, Why Use Machine Learning, Examples of Applications, *Types of Machine Learning Systems:* Supervised/Unsupervised Learning, Batch and Online Learning, Instance-Based Versus Model-Based Learning, *Main Challenges of Machine Learning:* Insufficient Quantity of Training Data, Non representative Training Data, Poor-Quality Data, Irrelevant Features, Overfitting the Training Data, Under fitting the Training Data, Stepping Back, *Testing and Validating:* Hyperparameter Tuning and Model Selection , Data Mismatch.

UNIT-II
Classification: Training a Binary Classifier, *Performance Measures:* Measuring Accuracy Using Cross-Validation, Confusion Matrix, Precision and Recall, Precision/Recall Trade-off, The ROC Curve, Multiclass Classification. **Decision Trees:** Training and Visualizing a Decision Tree, Making Predictions, Estimating Class Probabilities, The CART Training Algorithm, Computational Complexity, Gini Impurity or Entropy? Regularization Hyperparameters, Regression, Instability.

UNIT-III
Regression: *Linear Regression*: The Normal Equation, Computational Complexity, *Gradient Descent:* Batch Gradient Descent, Stochastic Gradient Descent, Mini-batch Gradient Descent, Polynomial Regression, Learning

Head Dept. of IT
CBIT, Hyderabad

Curves, *Regularized Linear Models:* Ridge Regression, Lasso Regression, Elastic Net, Early Stopping, *Logistic Regression:* Estimating Probabilities, Training and Cost Function, Decision Boundaries, Softmax Regression.

UNIT-IV
Support Vector Machines: Linear SVM Classification, Soft Margin Classification, *Nonlinear SVM Classification:* Polynomial Kernel, Similarity Features, Gaussian RBF Kernel, Computational Complexity, SVM Regression, *Under the Hood:* Decision Function and Predictions, Training Objective, Kernelized SVMs. **Bayes Classification:** Maximum Posteriori, Bayes Belief Networks.

UNIT-V
Dimensionality Reduction: The Curse of Dimensionality, Main Approaches for Dimensionality Reduction, PCA, Kernel PCA, **Unsupervised Learning Techniques:** *Clustering:* K-Means, Limits of K-Means, Using Clustering for Image Segmentation, DBSCAN, Other Clustering Algorithms, Gaussian Mixtures. **Ensemble Learning and Random Forests:** Voting Classifiers, Bagging and Pasting, Random Patches and Random Subspaces, Random Forests, Boosting.

Text Books:
1. Aurelien Geron, "Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow"- Concepts, Tools, and Techniques to Build Intelligent Systems, 2nd edition, O'Reilly,2019

Suggested Reading:
1. Tom Mitchel, "Machine Learning", Tata McGraW Hill, 2017.
2. Stephen Marshland, "Machine Learning: An Algorithmic Perspective", CRC Press Taylor & Francis, 2nd Edition, 2015

Web Resources:
1. https://www.coursera.org/specializations/machine-learning

Head Dept. of IT
CBIT, Hyderabad

20ADC07 FULL STACK DEVELOPMENT

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

Course Objectives:
1. To provide knowledge about web pages design and development.
2. To understand how the HTML, CSS and JavaScript components of Bootstrap work.
3. To explore the basic architecture of a React application and develop applications in agile mode.
4. To gain the basics of frond-end and back-end application development using Nodejs.
5. To understand the basics of MongoDB and its Data Model.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Create web pages with good aesthetic sense of design using HTML and CSS.
2. Create real-world React web applications and related tools.
3. Become an agile practitioner with the ability to quickly complete projects.
4. Build an end-to-end application from scratch using NODE JS.
5. Understand and build logical relationships between documents using MongoDB.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	1	1	-	-	-	1	1	1	1	3	2	3
CO2	2	1	2	1	2	-	-	-	-	-	1	-	2	2	3
CO3	2	1	2	2	1	-	-	-	-	-	-	-	3	3	3
CO4	2	1	1	1	1	-	-	-	-	-	-	1	1	3	3
CO5	2	1	1	1	1	-	-	-	-	-	-	1	1	3	3

UNIT-I
Introduction: Web Fundamentals, **HTML 5.0:** Basic tags, Images, Tables, Lists, Forms, Layout, Graphics, span and div tags.
Introduction to Cascading Style Sheets: Types of CSS**, text and font, color,** CSS Selectors, CSS BOX Model, CSS Positioning, and CSS floating, CSS Grid layout Module.

UNIT-II
Java Script: Data Types & Type Conversion, JSON, Events, String and Date Functions, Object Oriented Programming (OOP) in JS, Document Object Model, JavaScript Regular Expressions.
Bootstrap: Introduction of Bootstrap, Container and Container-fluid, Connectivity of Bootstrap in page.
Bootstrap Component: Jumbotron, Button, Grid, Table, Form, Alert, Panels, Image, Progress Bar, Tabs/Pill, Navbar, Modals.

UNIT-III
ics, State, Props, Components, Lifecycle, Events, Router, Forms, Tables, Portals, ES6, CSS, Hook, and Back End Integration.
Express JS: The model-view-controller pattern, Defining EJS template Engine Building a front-end controller, defining routes, creating actions, Configuring Express to use EJS, Using REST, Reading POST data Adding middleware .

UNIT-IV

10

Head Dept. of IT
CBIT, Hyderabad

Node JS Modules: Functions, Buffer, Modules, Modules Types, Core Module, Local Modules and Modules Exports

Node Package Manager: What is NPM? Installing Packages Locally, installing package globally, adding dependency in package Json and Updating packages.

Creating Web Server: Creating Web Server, Sending Requests and Handling HTTP requests.

File System: Read File, writing a File, opening a File Deleting a File, Writing a file asynchronously and Other I/O Operations.

Events: Event Emitter class, Inheriting Events and Returning event emitter.

UNIT-V

Mongo DB: Introduction, Importance of NoSQL databases, JSON features, Data types and examples. CRUD Operations, Data Modelling & Schema Design, Indexing and Aggregation, Mongo Import/Export and Master/Slave Replication.

Text Books:
1. Vasan Subramanian, "Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node", second Edition, Apress Publications, 2019.
2. David Hows, Peter Membrey, EelcoPlugge – "MongoDB Basics", Apress, 2014.

Suggested Reading:
1. Ethan Brown, "Web Development with Node and Express", Oreilly Publishers, First Edition, 2014.

Web Resources:
1. https://web.stanford.edu/class/cs142/index.html
2. https://nodejs.org/en/docs/
3. https://www.mongodb.com/
4. https://reactjs.org/
5. https://getbootstrap.com/docs/5.0/utilities/api/
6. https://edu.anarchocopy.org/Programming%20Languages/Node/Pro%20MERN%20Stack,%202nd%20 Edition.pdf

Head Dept. of IT
CBIT, Hyderabad

20ITC22   NETWORKS AND SECURITY LAB

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

Course Objectives:

1. To provide knowledge required to implement error detection, network routing algorithms and analyse traffic flow of the contents.
2. To present Client/Server applications based on TCP, UDP and SMTP using Java Socket API.
3. To facilitate knowledge required to handle rootkits, capture packets & interfaces.
4. To deal with the configuration and use of technologies designed to segregate the organization's systems from the insecure Network.
5. To familiarize with security policies of tcpdump, dumpcap and pentest tools using nmap.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. Identify Errors using CRC, Implement routing algorithms and congestion control algorithms.
2. Demonstrate client-server communication using TCP, UDP protocols.
3. Experiment with rootkits to detect malware, wire shark to capture the packets and interfaces.
4. Make use of tools, techniques to protect the system from attacks.
5. Acquire thorough knowledge on tcpdump, dumpcap and nmap.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	-	-	-	-	-	-	1	3	3	3
CO2	3	3	2	2	3	-	-	-	-	-	-	1	3	3	2
CO3	2	2	2	3	3	3	1	-	-	-	-	-	3	3	3
CO4	2	2	2	3	3	3	1	-	-	-	-	-	3	3	2
CO5	2	2	2	3	3	3	1	-	-	-	-	-	3	3	3

LIST OF PROGRAMS

1. Implement CRC Error detection technique.
2. Implement Dijkstra's and Distance Vector routing algorithms.
3. Implement congestion control using leaky bucket & Token bucket Algorithms.
4. Implementation of TCP (Server and client) and UDP (Server and client) .
5. Implement SMTP protocol.
6. Installation of rootkits and study about the variety of options.
7. Implement Wireshark to capture the packets and interfaces.
8. Demonstrate intrusion detection system using SNORT tool or any other software.
9. Setup a honey pot and monitor the honeypot on network using KF sensor.
10. Demonstrate how to managing securing policies using tcpdump, dumpcap using Wireshark.
11. Demonstration of pentest tools using Nmap, Wireshark.

Note:- Implement Programs 1 to 5 in C or Java

Head Dept. of IT
CBIT, Hyderabad

Text Books:
1. Andrew S. Tanenbaum, Computer Networks, Pearson Education,6th Edition,2021.
2. Michael Gregg, "Build Your Own Security Lab", Wiley Publishing, Inc., 2008.
3. Michael E.whitman, Herbert J.Mattord, Andrew Green ,"Hands on Information Security lab manual", Cengage Learning, Fourth edition, December 27, 2013.

Suggested Reading:
1. James F. Kurose, Keith W. Ross, "Computer Networking – A Top-Down Approach Featuring the Internet", 8th Edition, Pearson Education, 2022.
2. Alfred Basta, Wolf Halton, "Computer Security, concepts, issues and implementation", Cengage Learning India Pvt. Ltd, 2008.

Web Resources:
1. https://nmap.org
2. https://www.snort.org
3. https://www.wireshark.org
4. http://www.keyfocus.net/kfsensor/
5. http://www.gmer.net/

Head Dept. of IT
CBIT, Hyderabad

20ITC23   **BASIC MACHINE LEARNING LAB**

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

Course Objectives:
1. To impart knowledge of dimensionality reduction and clustering techniques.
2. To introduce the concept of decision tree for supervised learning.
3. To familiarize with Bayesian decision theory and probabilistic methods.
4. To introduce the concept of SVM.
5. To familiarize with ensemble methods.

Course Outcomes:
 Upon successful completion of the course the students will be able to:
1. Perform dimensionality reduction of a dataset.
2. Build decision trees for classification.
3. Design solutions using SVM, KNN, Regression algorithms.
4. Perform clustering of data.
5. Use principle Component Analysis for feature Extraction.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	2	1	-	-	-	-	-	-	-	1	-	2
CO2	1	1	-	2	1	-	-	-	-	-	-	-	2	-	2
CO3	2	1	1	2	2	-	-	-	-	-	-	-	2	-	2
CO4	1	2	1	2	1	-	-	-	-	-	-	-	2	-	2
CO5	2	1	-	2	1	-	-	-	-	-	-	-	2	-	2

LIST OF PROGRAMS
1. a) Vectors, Matrices, and Arrays representation, Loading of data
   b) Data Wrangling, Handling Numerical and Categorical Data
2. Dimensionality Reduction Using Feature Extraction, Feature Selection
3. Linear Regression, Nonlinear Regression, Ridge Regression, Esso Regression, Logistic Regression
4.
5. K-Nearest Neighbors
6. Support Vector Machines
7. Naive Bayes classifier
8. Principle Component Analysis
9. Clustering using K-Means, DBSCAN, Hierarchical Merging
10. Model Selection, Saving and Loading Trained Models.

14

Text Book:
1. Aurelien Geron, "Hands-on Machine Learning with Scikit-Learn, Keras, and Tensor Flow", O'Reilly Media, 2nd Edition, 2019.

Suggested Reading:
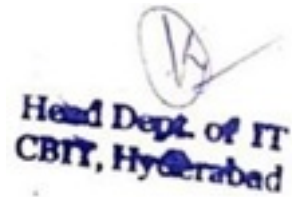1. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", Cambridge University Press, 1st Edition, 2012.

Datasets:
1. https://www.kaggle.com/datasets
2. https://www.csie.ntu.edu.tw/~cjlin/libsvmtools/datasets/multilabel.html#siam-competition2007

Web Resource:
1. https://www.coursera.org/specializations/machine-learning

Head Dept. of IT
CBIT, Hyderabad

20ITI02

<div align="center">

INDUSTRIAL INTERNSHIP/ RURAL INTERNSHIP

</div>

Instruction/Demonstration/Training	3-4 Weeks/90 Hours
Duration of SEE	--
SEE	--
CIE	50 Marks
Credits	2

Prerequisite: Knowledge of Basic Sciences and Engineering Sciences/Knowledge about rural environment

Course Objectives: This course aims to:
1. Exposing the students to the industrial environment/ rural environment
2. Create awareness on the current industrial technological developments in the domain of IT
3. Provide opportunity to understand the social, economic feasibility aspects in the process of product/prototype development

Course Outcomes: Upon completion of this course, students will be able to:
1. Understand Engineer's responsibilities and ethics
2. Use state of the art Tools and technologies
3. Provide innovative solutions to solve real world problems
4. Acquire knowledge in technical reports writing and presentation
5. Apply technical knowledge to real world industrial/rural situations

.

<div align="center">

Course Articulation Matrix

</div>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	-	3	-	3	3	2	-	3
CO2	1	1	1	3	3	-	2	1	-	-	-	-	3	3	-
CO3	2	3	3	3	3	2	3	1	1	-	-	-	3	3	-
CO4	-	-	-	-	-	3	-	1	3	3	-	1	-	-	3
CO5	1	3	3	3	3	2	3	-	1	-	-	1	3	3	3

For implementation procedures and letter formats, annexures I and III of Internship document may be referred.

Evaluation of Internship: The industrial training/internship of the students will be evaluated in three stages:

a) Evaluation by the Industry (in the scale of 1 to 10 where 1-Unsatisfactory; 10-Excellent)

b) Evaluation by faculty Mentor on the basis of site visit(s) or periodic communication (15 marks)

c) Evaluation through seminar presentation/Viva-Voce at the Institute by the constituted committee (25 marks)

Evaluation through Seminar presentation/Viva-Voce at the institute: Students shall give a seminar before an E*xpert Committee* constituted by college (Director, HoD/Senior faculty, mentor and faculty expert from the same department) based on his/her training/internship carried out

The evaluation will be based on the following criteria:

- Quality of content presented
- Proper planning for presentation
- Effectiveness of presentation
- Depth of knowledge and skills

Head Dept. of IT
CBIT, Hyderabad

47

- Attendance record, daily diary, departmental reports shall be analyzed along with the internship Report

Monitoring/ Surprise Visits: During the internship program, the faculty mentor makes a surprise visit to the internship site, to check the student's presence physically. If the student is found to be absent without prior intimation to the concerned industry, entire training/internship may be canceled. Students should inform through email to the faculty mentor as well as the industry supervisor at least one day prior to avail leave.

Head Dept. of IT
CBIT, Hyderabad

20ADC09

MINOR PROJECT-I

(Full Stack Development Lab)

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

Course Objectives:

1. To enable students to learn by doing.
2. To develop capability to analyze and solve real world problems.
3. To inculcate innovative ideas of the students.
4. To impart team building and management skills among students.
5. To instill writing and presentation skills for completing the project.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. Interpret Literature with the purpose of formulating a project proposal.
2. Plan, analyze, Design and implement a project.
3. Find the solution of identified problem with the help of modern Technology and give priority to real time scenarios.
4. Plan to work as a team and to focus on getting a working project done and submit a report within a stipulated period of time.
5. Prepare and submit the Report and deliver a presentation before the departmental Committee.

Minor Project is aimed to enable the students to develop a product/application based on the course **FULL STACK DEVELOPMENT** with course code- **20ADC07**. The student has to implement and present the project as per the given schedule. During the implementation of the project, Personnel Software Process (PSP) has to be followed. Report of the project work has to be submitted for evaluation.

SCHEDULE

S No	Description	Duration
1.	Problem Identification / Selection	1 week
2.	Preparation of Abstract	1 week
3.	Design the Web Pages using advanced HTML Form tags input–date, time, number, email, HTML5 Header and Footer, spell check and editable areas.	1 week
4.	Demonstrate the CSS tags Inline, Internal and External Style sheets using advanced CSS in web pages	1 week
5.	Demonstrate JavaScript to perform validation and Bootstrap in Front-End Design.	1 week
6.	Implement React JS, MVC Pattern and Node JS Features in the application.	2 weeks
7.	Implement CRUD operations/DB Replication in MongoDB.	2 weeks
8.	Implementation and inferences	2 weeks

Head Dept. of IT
CBIT, Hyderabad

S No	Description	2 weeks
9.	Documentation and Project Presentation	2 weeks

Guidelines for the Award of marks

S No	Description	Max. Marks
	Final Assessment	
1.	PPT Preparation	10
2.	Technical Content	10
3.	Question and Answers	5
4.	Report Preparation	5
	Total	**30**

Final Minor Project demonstration and PPT presentation is to be evaluated for the entire class together by all the faculty handling Minor Project for that class.

Head Dept. of IT
CBIT, Hyderabad

20ITE05   INFORMATION RETRIEVAL SYSTEMS
                                (Professional Elective –2)

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

Course Objectives:
1. To familiarize with different Information Retrieval models.
2. To learn query languages for data retrieval.
3. To introduce various methods for efficient retrieval of information.
4. To impart knowledge on text operations.
5. To introduce Parallel and Distributed IR models.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Understand different Information Retrieval models.
2. Apply query language to retrieve the data and evaluate performance.
3. Analyze various methods to improve the retrieval results.
4. Perform operations on text and build indices.
5. Analyze searching techniques and understand Parallel and Distributed IR models.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	2	-	-	-	-	-	1	-	1	2	1	1
CO2	3	2	1	2	-	-	-	-	-	-	-	2	2	1	2
CO3	1	1	1	1	1	2	1	1	1	1	1	1	1	3	2
CO4	3	2	1	2	-	-	-	-	-	-	-	2	2	2	2
CO5	2	2	1	2	-	-	-	-	-	-	-	2	2	1	2

UNIT-I
Introduction: Basic concepts, Past, Present and Future of IR, The Retrieval Process.
Modeling: Introduction, A Taxonomy of IR Models, Retrieval: Adhoc and Filtering, A formal characterization of IR Models, Classic Information Retrieval, Alternative Set Theoretic Models, Alternative Algebraic Models, Alternative Probabilistic Models.

UNIT-II
Structured Text Retrieval Models, **Models for Browsing**
Retrieval Evaluation: Introduction, Retrieval Performance Evaluation, Reference Collections
Query languages: Introduction, Keyword-based querying, pattern Matching, Structural Queries, Query Protocols

UNIT-III
Query operations: Introduction, User Relevance Feedback, Automatic Local Analysis, Automatic Global Analysis
Text and Multimedia Languages and Properties: Introduction, Metadata, Text, Markup Languages, Multimedia

Head Dept. of IT
CBIT, Hyderabad

UNIT-IV
Text Operations: Introduction, Document Preprocessing, Document Clustering, Text Compression, Comparing Text Compression Techniques **Indexing:** Introduction, Inverted Files, Other Indices for Text, Boolean Queries

UNIT-V
Searching: Sequential Searching, Pattern Matching, Structural Queries, Compression
Parallel and Distributed IR: Introduction, Parallel IR, Distributed IR.

Text Book:
1. Ricardo, Baeza-yates, BerthierRibeiro-Neto, "Modern Information Retrieval", Pearson Education, 2008.

Suggested Reading:
1. Christopher D. Manning, PrabhakarRaghavan, HinrichSchütze, "Introduction to Information Retrieval", Cambridge University Press, 2009.
2. David A. Grossman, OphirFrieder, "Information Retrieval - Algorithms and Heuristics", Springer, 2nd Edition, 2004.
3. Gerald Kowalski, "Information Retrieval Systems: Theory and Implementation", Springer.
4. William B. Frakes, Ricardo Baeza- Yates, "Information Retrieval – Data Structures & Algorithms", Pearson Education, 2008.

Web Resources:
1. https://class.coursera.org/nlp/lecture
2. http://www.dcs.gla.ac.uk/Keith/Preface.html

Head Dept. of IT
CBIT, Hyderabad

20ITE06   **ADVANCED DATABASES**
                        (Professional Elective –2)

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

Course Objectives:
1. To provide basic foundation in advanced database concepts.
2. To familiarize distributed database system design.
3. To gain knowledge in query processing and transaction management in distributed database environment.
4. To acquire knowledge on query optimization principles.
5. To impart the knowledge on distributed transaction principles.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Acquire knowledge on distributed, parallel and multimedia databases.
2. Distinguish the design, query processing and transaction management activities in centralized and distributed databases.
3. Apply query optimization principles for optimizing query performance in distributed database systems.
4. Utilize distributed transaction principles for handling transactions in distributed database applications.
5. Develop databases for various applications.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	1	1	-	-	1	1	1	1	1	2	1	1
CO2	3	3	3	1	1	-	-	1	1	1	1	1	2	1	1
CO3	2	2	2	1	1	-	-	1	1	1	1	1	1	1	1
CO4	1	1	1	1	2	-	-	1	1	1	1	1	1	1	1
CO5	2	2	3	1	1	-	-	1	1	1	1	1	2	2	2

UNIT-I
Introduction: What is a Distributed Database System?, Complications Introduced by Distribution, Distributed DBMS Architecture.
Distributed Database Design: Top-Down design process, Distribution Design Issues, Fragmentation and Allocation.

UNIT-II
Database Integration: Bottom-up design methodology, Schema Matching, Schema Integration, Schema Mapping.
View Management, Data Security.
Overview of Query Processing: Query processing problem, Objectives of Query processing, Complexity of Relational Algebra Operations, Characterization of Query Processors, and Layers of Query Processing.

Head Dept. of IT
CBIT, Hyderabad

UNIT-III
Query Decomposition and Data Localization: Query Decomposition, Localization of Distributed Data.
Optimization of Distributed Queries: Query Optimization, Join Ordering in Distributed Queries, Distributed Query Optimization.

UNIT-IV
Distributed Concurrency Control: Taxonomy of Concurrency control Mechanisms, Lock-Based Concurrency Control Algorithms, Timestamp-Based Concurrency Control Algorithms, Optimistic Concurrency Control Algorithms, and Deadlock Management.
Introduction to Transaction Management: Definition of a Transaction, Properties of Transactions, Types of Transactions.

UNIT-V
Distributed DBMS Reliability: Reliability Concepts and Measures. Failures in Distributed DBMS, Local Reliability Protocols. Distributed Reliability Protocols, Dealing with Site Failures.
Parallel Database systems: Parallel Database System Architectures, Parallel Data Placement, Parallel Query Processing.
Multimedia Database Management Systems: Introduction, Multimedia storage and retrieval, Multimedia Data Access, Querying Multimedia Databases, Distributed MMDBMS Architecture**,** Introduction to Graph databases.

Text Books:
1. M T Ozsu, Patrick Valduriez, "Principles of Distributed Database Systems", Prentice Hall, third edition, 1999.
2. B.Prabhakaran "Multimedia Database Management systems", Springer International Edition, second edition, 2007.
3. Ian Robinson , Jim Webber, Emil Eifrem "Graph Databases" O'Reilly Media, Second edition, 2015.

Suggested Reading:
1. S. Ceri and G. Pelaggati, "Distributed Database System Principles and Systems", MGH, 1985.
2. M. Stonebraker, "Readings in Database Systems:, 2nd Edition, Morgan Kauffman, 1993.
3. D. Bell and J. Grimson, "Distributed Database Systems", Addison-Wesley, 1st Edition, 1992.

Web Resources:
1. https://ocw.snu.ac.kr/sites/default/files/NOTE/3076.pdf
2. http://www.inf.ed.ac.uk/teaching/courses/adbs/slides/adbs.pdf
3. https://vulms.vu.edu.pk/Courses/CS712/Downloads/Principles%20of%20Distributed%20Database%20 Systems.pdf
4. https://www.technicalbookspdf.com/multimedia-database-management-systems-by-mr-b-prabhakaran/
5. https://neo4j.com/graph-databases-book/thanks/?aliId=eyJpIjoiUHBsSVA2NGpBQVwvM3kxXC9NIiwidCI6InpUVWVvSGlIUVJEaTN GRmgwWThrQXc9PSJ9

20ITE07   **AUGMENTED REALITY AND VIRTUAL REALITY**
                                    (Professional Elective –2)

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

Course Objectives:
1. To familiarize the students with the fundamentals of Virtual Reality.
2. To impart the knowledge of 3D orientation for understanding the behavior of VR system with the environment.
3. To deal with the Development Tools and Frameworks in Virtual Reality.
4. To introduce the applications of Virtual Reality Systems.
5. To introduce technology and features of augmented reality

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Describe the basic concepts of Virtual Reality and 3D Computer Graphics.
2. Apply 3D manipulation techniques in Virtual Reality.
3. Analyze Development Tools and Frameworks in Virtual Reality.
4. Develop a Virtual Reality application.
5. Evaluate Augmented Reality Systems

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	-	2	2	-	-	-	1	-	1	3	-	1
CO2	2	2	1	1	2	2	-	-	-	1	-	1	3	-	2
CO3	2	1	1	-	1	2	-	-	1	1	-	1	3	-	1
CO4	2	2	1	2	3	2	-	-	1	1	-	1	3	-	1
CO5	2	2	1	2	3	-	-	-	1	1	-	1	3	-	1

UNIT-I
Introduction to Virtual Reality: History of VR and AR, Technology and Features of Augmented Reality, Comparison of AR and VR, Challenges with AR, AR Systems and Functionality, Human factors, Human visual system, Perception of depth, color, contrast, resolution, Stereo Rendering, VR Hardware: Head-coupled displays etc. VR Software, Geometric Modelling: From 2D to 3D, 3D space curves, 3D boundary representation. The Graphics Pipeline and OpenGL, Overview and Transformations, Rotation, translation, scaling, mode view matrix, projection matrix, Lighting and Shading, OpenGL Shading Language (GLSL), GLSL vertex and fragment shaders.

UNIT-II
Visual computation in virtual reality: 3D Interaction Techniques: 3D Manipulation Techniques and Input Devices, 3D Travel Tasks, Travel Techniques, Theoretical Foundations of Wayfinding, Types of Centred-Wayfinding Support, Evaluating Wayfinding Aids, System Control, Classification, Graphical Menus, Voice Commands, Gestrual Commands, Tools, Muti-modal System Control Techniques,Case Study: Mixing System Control Methods, Symbolic Input Tasks.

Head Dept. of IT
CBIT, Hyderabad

UNIT-III

Framing using 3D virtual reality: Development Tools and Frameworks in Virtual Reality: VR. X3D Standard; Vega, MultiGen, Virtools etc., World Space, World Coordinate, World Environment, Objects - Geometry, Position / Orientation, Hierarchy, Bounding Volume, Scripts and other attributes, VR Environment - VR Database, Tessellated Data, LODs, Graphical User Interface, Control Panel, 2D Controls.

UNIT-IV

VR applications: Pose Tracking I, Tracking with lighthouse, Pose Tracking II, Advanced positional tracking, Panoramic Imaging and Cinematic, VR Spatial Sound and the Vestibular System, VR Engines and Other Aspects of VR, Latency, eye tracking, post-rendering warp. The Future: Virtual environment, modes of interaction Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games, Demonstration of Digital, Entertainment by VR.

UNIT- V

Augmented and Mixed Reality: Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

Text Books:
1. La Valle, "Virtual Reality", Cambridge University Press, 2016.
2. John Vince, "Virtual Reality Systems", Pearson Education Asia, 2007.

Suggested Reading:
1. Alan B Craig, William R Sherman and Jeffrey D Will, —Developing Virtual Reality Applications: Foundations of Effective Design‖, Morgan Kaufmann, 2009.
2. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013
3. Ange Anderson, Virtual Reality, Augmented Reality and Artificial Intelligence in Special Education, 2019

Web Resources:
1. https://nptel.ac.in/courses/106/106/106106138/
2. https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ge08/
3. https://www.coursera.org/learn/ar?
4. https://www.coursera.org/specializations/virtual-reality

Head Dept. of IT
CBIT, Hyderabad

20ITE08 CYBER SECURITY
(Professional Elective –2)

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

Course Objectives:
1. To present basic concepts of Cybercrime and Cyberattacks.
2. To impart knowledge on Tools and Methods used in Cybercrime.
3. To familiarize the legal perspectives and Organizational implications of Cyber Security.
4. To present fundamentals concepts in Cyber Forensics.
5. To familiarize about regulatory framework for Cybersecurity.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Describe legal frameworks to handle cybercrimes.
2. Identify the functioning of different kinds of malware used in cybercrimes.
3. Examine the legal perspectives of cybercrimes in Indian and international context.
4. Describe the need of Digital Forensics and the importance of digital evidence in prosecution
5. Interpret the commercial activities in the event of significant information security incidents in the Organization.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	3	-	3	-	-	2	-	3	3	1
CO2	2	3	1	2	3	3	-	3	-	-	-	-	3	3	1
CO3	2	2	1	-	-	3	-	3	-	-	-	-	3	3	1
CO4	2	3	1	2	3	3	-	3	-	-	-	-	3	3	1
CO5	2	1	1	2	-	3	-	3	-	-	2	-	3	3	1

UNIT–I
Introduction to Cybercrime: Definition and origins of the word, Cybercrime and Information security, Classification of Cybercrimes, Legal Perspectives, Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT-II
Cyber offenses: Introduction, How Criminals plan the attacks, Social Engineering, CyberStalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector.
Tools and Methods Used in Cybercrime: Introduction, Proxy servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDos Attacks, SQL Injection, Buffer Overflow,

UNIT-III
Cyber Security: The Legal Perspectives: Cyber Crime and the Legal Landscape around the World, Need of Cyber laws: the Indian Context, The Indian IT Act, Challenges to Indian Law and Cyber Crime Scenario in India, Digital Signatures and the Indian IT Act, Cyber Crime and Punishment, Cyber Law, Technology and Students: The Indian Scenario.

Head Dept. of IT
CBIT, Hyderabad

UNIT-IV
Understanding Cyber Forensics: Introduction, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Forensics Analysis of Email, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Cyber Forensics Investigation, Challenges in Computer Forensics

UNIT-V
Organizational Implications: Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

Text Books:
1. Nina Godbole, Sunit Belapure, "Cyber Security Understanding Cyber Crimes, Computer forensics and Legal Perspectives", Wiley India Pvt.Ltd., 2013.
2. Harsh Bothra, "Hacking Be A Hacker with Ethics", Khanna Publishers 2017.

Suggested Reading:
1. John R Vaca "Computer Forensics: Computer crime scene Investigation", 2017.
2. Ferrera, Reder, Bird, Darrow, Aresty, Klosek, Lichtenstein, " Cyber Laws Text & Cases", 3rd Edition.
3. Tony Sammes, Brian Jenkinson, "Forensic Computing: A practitioner's Guide", Second Edition Springer International Edition.
4. Bill Nelson, Amelia Phillips, Christopher Steuart, "Guide to Computer Forensics and Investigations", Fourth Edition.

Web Resources:
1. https://www.nist.gov/
2. https://www.sans.org/
3. https://www.udemy.com/the-complete-cyber-security-course-end-point-protection/

Head Dept. of IT
CBIT, Hyderabad

20ITE09   **SOFTWARE PROJECT MANAGEMENT**
                                  (Professional Elective –2)

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

Course Objectives:
1. To understand the Software Project Planning and Evaluation techniques.
2. To learn about the activity planning and risk management principles.
3. To manage software projects and control software deliverables.
4. To develop skills to manage the various phases involved in project management and people management.
5. To deliver successful software projects that support organization's strategic goals.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Understand Project Management principles while developing software.
2. Obtain adequate knowledge about software process models and software effort estimation techniques.
3. Estimate the risks involved in various project activities.
4. Define the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.
5. Learn staff selection process and the issues related to people management

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	1	-	-	-	1	-	-	1	2	3	-
CO2	2	1	1	-	1	-	-	-	-	-	-	1	1	3	-
CO3	2	2	1	-	-	-	-	-	-	-	2	2	2	3	2
CO4	2	1	-	-	-	-	-	-	-	-	2	2	2	3	3
CO5	2	1	-	-	-	-	-	-	1	-	2	2	2	3	3

UNIT-I
Project Evaluation and Project Planning: Importance of Software Project Management, Activities - Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

UNIT-II
Project Life Cycle and Effort Estimation: Software process and Process Models – Choice of Process models - Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II - a Parametric Productivity Model.

UNIT-III
Activity Planning and Risk Management: Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path method (CPM) – Risk identification – Assessment – Risk Planning –

Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.

UNIT-IV
Project Management and Control: Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.

UNIT-V
Staffing in Software Projects: Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

Text Book:
1. Bob Hughes, Mike Cotterell and Rajib Mall: "Software Project Management", Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

Suggested Reading:
1. Robert K. Wysocki , "Effective Software Project Management‖", Wiley Publication, 2011.
2. Walker Royce: ―"Software Project Management" Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, ―"Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013.

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

**Scheme of Instruction of VI Semester of B.E. – Information Technology
as per AICTE Model Curriculum w.e.f: 2022-23**

DEPARTMENT OF INFORMATION TECHNOLOGY

SEMESTER –VI

S.No	Course code	Title of the Course	Scheme of Instruction		Scheme of Examination			Credits
			Hours per week		Duration of SEE in Hours	Maximum Marks		
			L/T	P/D		CIE	SEE	
THEORY								
1	20ADC14	Big Data Analytics	3	-	3	40	60	3
2	20ITC24	Embedded Systems and IoT	3	-	3	40	60	3
3	20ADC10	Deep Learning	3	-	3	40	60	3
4	20ITC25	Cloud Computing	3	-	3	40	60	3
5		Professional Elective - 3	3	-	3	40	60	3
6	20EGM03	Universal Human Values II: Understanding Harmony	3	-	3	40	60	3
PRACTICALS								
7	20ADC15	Big Data Analytics Lab	-	3	3	50	50	1.5
8	20ITC26	Embedded Systems and IoT Lab	-	3	3	50	50	1.5
9	20ITC27	Minor Project-II (Deep Learning Lab)	-	3	-	50	-	1.5
10	20EGCO3	Employability Skills	-	2	2	50	50	1
TOTAL			**18**	**11**		**440**	**510**	**23.5**

L: Lecture   T: Tutorial   P: Practical
CIE - Continuous Internal Evaluation   SEE - Semester End Examination

Professional Elective-3		
S.No.	**Course Code**	**Course Name**
1.	20ADE03	Natural Language Processing
2.	20ITE10	Data Compression
3.	20ADE06	Microservices with Spring Boot
4.	20ITE11	Ethical Hacking
5.	20ITE12	Agile Methodologies

Head Dept. of IT
CBIT, Hyderabad

20ADC14   **BIG DATA ANALYTICS**

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

Course Objectives:
1. To introduce the importance of big data, role of Hadoop framework in analyzing large datasets by writing mapper and reducer for a given problem.
2. To familiarize writing queries in Pig and Hive to process big data.
3. To present latest big data frameworks and applications using Spark and Scala.
4. To discuss the concept and writing applications using SparkSQL.
5. To provide the concepts of NoSQL databases and study the working mechanisms of MongoDB.

Course Outcomes:
Upon completing this course, students will be able to:
1. Understand the processing large datasets in Hadoop framework and Apply MapReduce architecture to solve real world problems.
2. Develop scripts using Pig over large datasets and query using Hive.
3. Understand the fundamentals of Spark and the Scala programming.
4. Expertise in using Resilient Distributed Datasets (RDD) for creating applications in Spark and query using SparkSQL.
5. Understand NoSQL databases and Develop data models using MongoDB.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	3	-	-	-	-	-	-	1	3	3	3
CO2	2	3	2	3	3	-	-	-	-	-	-	1	3	3	3
CO3	2	3	2	3	3	-	-	-	-	-	-	1	3	3	3
CO4	2	3	2	3	3	-	-	-	-	-	-	1	3	3	3
CO5	2	3	2	3	3	-	-	-	-	-	-	1	3	3	3

UNIT-I
What is Big Data: Why is Big Data Important? When to consider a Big Data solution, Big Data use cases
The Hadoop Distributed Files system: The Design of HDFS, HDFS Concepts, HDFS Federation, HDFS High Availability, Basic File system Operations, Hadoop File systems, Anatomy of a File Read, Anatomy of a File Write.
⬛⬛⬛⬛⬛⬛: What is Map reduce, Architecture of map reduce.
How MapReduce Works: Anatomy of a MapReduce Job Run, Failures in Map Reduce, MapReduce Types and Formats: MapReduce Types, The Default MapReduce Job, Input Formats, Input Splits and Records, Text Input, Output Formats, Text Output, Developing a MapReduce Application.

UNIT-II

Head Dept. of IT
CBIT, Hyderabad

Pig: Installing and Running Pig, an Example, Generating Examples, Comparison with Databases, Pig Latin, User-Defined Functions, Data Processing Operators, Pig in Practice.

Hive: Installing Hive, The Hive Shell, An Example, Running Hive, Comparison with Traditional Databases, HiveQL, Tables, Querying Data, User-Defined Functions, Writing a User Defined Functions, Writing a User Defined Aggregate Function.

UNIT-III
Introduction to Spark: What is Apache Spark, History of Spark, The Present and Future of Spark, Running Spark, Spark's Basic Architecture Spark Applications Spark's Language APIs Spark's APIs Starting Spark, The SparkSession DataFrames, Partitions, Transformations, Lazy Evaluation, Actions, Spark UI, An End-to-End Example, DataFrames and SQL. **Spark's Toolset:** Running Production Applications, Datasets: Type-Safe Structured APIs, Structured Streaming, Machine Learning and Advanced Analytics, Lower-Level APIs, SparkR, Spark's Ecosystem and Packages.

UNIT-IV
Spark SQL: What Is SQL?, Big Data and SQL: Apache Hive, Big Data and SQL: Spark SQL, Spark's Relationship to Hive, How to Run Spark SQL Queries, Catalog, Tables, Views, Databases, Select Statements
Datasets: When to Use Datasets, Creating Datasets, Actions, Transformations.
Resilient Distributed Datasets: Introduction to RDDs, Creating RDDs, Manipulating RDDs, Transformations, Actions, Saving Files, Caching, Check pointing, Pipe RDDs to System Commands.

UNIT-V
No SQL Databases: Review of traditional Databases, Need for NoSQL Databases, Columnar Databases, Failover and reliability principles, CAP Theorem, Differences between SQL and NoSQL databases, **Working mechanisms of Mongo DB**: Overview, Advantages, Environment, Data Modelling, Create Database, Drop Database, Create collection, Drop collection, Data types, Insert, Query, Update and Delete operations, Limiting and Sorting records, Indexing, Aggregation.

Text Books:
1. Tom White, "Hadoop: The Definitive Guide", 4th Edition, O'Reilly Media Inc, 2015.
2. Bill Chambers, Matei Zaharia, "Spark: The Definitive Guide", 4th Edition, O'Reilly Media Inc, 2018

Suggested Reading:
1. Thilinagunarathne, "Hadoop MapReduce v2 Cookbook", 2nd Edition, Packet Publishing, 2015.
2. Chuck Lam, Mark Davis, Ajit Gaddam, "Hadoop in Action", Manning Publications Company, 2016.
3. Alex Holmes," Hadoop in Practice", Manning Publications Company, 2012.
4. Alan Gates, "Programming Pig", O'Reilly Media Inc, 2011.
5. Edward Capriolo, Dean Wampler, and Jason Rutherglen, "Programming Hive", O'Reilly Media Inc, October 2012.

Web Resources:
1. http://www.planetcassandra.org/what-is-nosql
2. http://www.iitr.ac.in/media/facspace/patelfec/16Bit/index.html
3. https://class.coursera.org/datasci-001/lecture
4. http://bigdatauniversity.com

Head Dept. of IT
CBIT, Hyderabad

20ITC24   EMBEDDED SYSTEMS AND IOT

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

Course Objectives:
1. To introduce the basic concepts of embedded system and 8051 Microcontroller fundamentals.
2. To provide an overview of Internet of Things, building blocks of IoT and to explore various IoT enabling technologies
3. To facilitate the design methodology for IoT.
4. To introduce about the Raspberry Pi device, its interfaces and Django Framework.
5. To deal with software systems and the utilities for case studies.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Demonstrate Embedded Systems using 8051 Microcontroller.
2. Interpret the various IoT enabling technologies, Levels.
3. Apply IoT design methodology to build a model using devices like Raspberry Pi3.
4. Develop Domain specific Applications and able to differentiate between M2M and IoT.
5. Infer on Industrial IoT through Real case studies.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	2	3	-	1	1	1	1	1	3	3	3
CO2	2	1	2	1	2	-	3	-	-	-	2	-	3	-	2
CO3	2	1	2	2	2	3	-	-	-	-	2	-	3	-	3
CO4	2	1	1	1	2	-	3	2	-	-	1	1	3	3	2
CO5	2	1	1	1	1	-	-	2	-	-	-	1	3	-	1

UNIT-I
Embedded Computing: Introduction Embedded System Design Process, Characteristics and Challenges of Embedded Systems. **The 8051 Architecture**: Introduction, 8051 Micro controller Hardware. Data Transfer and Logical Instructions, Arithmetic Operations, Decimal Arithmetic, Jump and Call Instructions Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions.

UNIT-II
Introduction to Internet of Things: Definitions & Characteristics of IoT, Physical Design of IOT-Things in IoT, IoT Protocols, Logical Design of IOT-IoT Functional Blocks, IoT Communication Models, IoT Communication APIs, IOT Enabling Technologies-Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems, IOT Levels & Deployment Templates.

UNIT-III
IoT Platforms Design Methodology: Introduction, IoT Design Methodology Steps-Purpose and Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service

Head Dept. of IT
CBIT, Hyderabad

Specifications, IoT Level Specification, Functional View Specification, Operational View Specification, Device and Component Integration, Application Development, Case Study on IoT System for Weather Monitoring.

IoT Physical Devices and End Points: Basic building blocks of an IoT device, Raspberry Pi About the board, Raspberry Pi interfaces-Serial, SPI, I2C. Python Web Application Framework: Django Framework-Roles of Model, Template and View.

UNIT-IV

Domain Specific IOTs: Various types of IoT Applications in Home Automation- smart lighting, Smart appliance, smoke and gas detectors, Cities, Environment, Energy, Retail, Logistics Agriculture, Industry, Health & Life Style-Wearable Electronics. **IoT and M2M** – Introduction, M2M, Differences between IoT and M2M, Software Defined Networking, Network Function Virtualization.

UNIT-V

Industrial IoT: Introduction to Industrial IoT, IIoT Communication, Industry 4.0 Globalization and Emerging Issues, The Fourth Revolution, Security and Fog Computing.
Real case studies:

Case study - I: Milk Processing and Packaging Industries
Case study - II: Manufacturing Industries

Text Books:
1. Wayne Wolf, "Computers as Components", 1st Edition, Academic press, 2001.
2. Kenneth J.Ayala, "The 8051 Microcontroller", 3rd Edition, Thomson, 2014.
3. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 2014.
4. Misra, C. Roy, and A. Mukherjee, 2020 "Introduction to Industrial Internet of Things and Industry 4.0". CRC Press.

Suggested Reading:
1. Raj Kamal, "Embedded Systems", 2nd Edition, McGraw Hill, 2015.
2. Samuel Greengard, "The Internet of Things", 1st Edition, MIT Press, 2015.
3. Peter Waher, Pradeeka Seneviratne, Brian Russell, Drew Van Duren, "IoT: Building Arduino-Based Projects", 1st Edition, Packt Publishing Ltd, 2016.
4. Jeeva Jose, "Internet of Things", Khanna Book Publishing Company,

Web Resources:
1. http://ee.sharif.edu/~sakhtar3/books/The%208051%20Microcontroller%20Ayala/The%208051%20Microcontroller%20Architecture,%20Programming%20and%20Applications%201991.pdf
2. https://slideplayer.com/slide/3944480/.
3. https://nptel.ac.in/noc/individual_course.php?id=noc17-cs05.
4. https://slideplayer.com/slide/5740917/.
5. https://onlinecourses.nptel.ac.in/noc20_cs69/preview

Head Dept. of IT
CBIT, Hyderabad

20ADC10   **DEEP LEARNING**

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

Course Objectives:
1. To impart knowledge on the basic concepts of Neural Networks and Deep learning.
2. To familiarize various neural network architectures.
3. To learn usage of neural networks for problem solving.
4. To familiarize various deep learning models.
5. To facilitate usage of deep learning applications in societal context.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Explain the basic principles of neural networks and deep learning.
2. Implement simple neural network algorithms.
3. Compare modeling aspects of various neural network architecture.
4. Evaluate Convolutional Neural Network models on real data sets.
5. Analyze and optimize Recurrent Neural Network models for various applications.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	-	-	-	-	-	-	1	1	2	3	2
CO2	2	2	2	2	1	-	-	-	-	-	1	1	2	3	2
CO3	2	2	1	1	1	-	-	-	-	-	1	-	2	-	2
CO4	2	2	2	2	1	-	-	-	-	-	1	1	2	3	2
CO5	-	1	1	1	1	-	-	-	-	-	-	-	2	-	2

UNIT-I
Introduction to Artificial Neural Networks: From Biological to Artificial Neurons, Implementing MLP, Fine-Tuning Neural Network Hyper parameters, Training Deep Neural Networks: The Vanishing/Exploding Gradients Problems, Reusing Pre trained Layers, Faster Optimizers and Avoiding Overfitting through Regularization.

UNIT-II
: Linear Regression, Linear Regression Implementation from Scratch, Concise Implementation of Linear Regression, Softmax Regression, The Image Classification Dataset, Implementation of Softmax Regression from Scratch, Concise Implementation of Softmax Regression.

UNIT-III
Deep Learning Computation: Layers and Blocks, Parameter Management, Deferred Initialization, Custom Layers, File I/O, GPUs Convolutional Neural Networks: From Fully-Connected Layers to Convolutions, Convolutions for Images, Padding and Stride, Multiple Input and Multiple Output Channels, Pooling, Convolutional Neural Networks (LeNet).

Head Dept. of IT
CBIT, Hyderabad

UNIT-IV

Mode▨▨▨▨▨▨▨▨▨▨▨▨▨: Deep Convolutional Neural Networks (AlexNet), Networks Using Blocks (VGG), Network in Network (NiN), Networks with Parallel Concatenations (GoogLeNet), Batch Normalization, Residual Networks (ResNet), Densely Connected Networks (DenseNet), Recurrent Neural Networks: Sequence Models, **Recurrent Neural Networks**: Implementation of Recurrent Neural Networks from Scratch, Concise Implementation of Recurrent Neural Networks.

UNIT-V

Modern ▨▨▨▨▨▨▨▨▨▨▨▨: Gated Recurrent Units (GRU), Long Short-Term Memory (LSTM), Deep Recurrent Neural Networks, Bidirectional Recurrent Neural Networks, Machine Translation and the Dataset, Encoder-Decoder Architecture, Sequence to Sequence Learning.

Optimization Algorithms: Optimization and Deep Learning, Convexity, Gradient Descent, Stochastic Gradient Descent.

Text Books:
1. Aurélien Géron, "Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow", Orielly, 2nd edition, 2019.
2. Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola, "Dive into Deep Learning", d2l.ai, 2021

Suggested Reading:
1. Levitin A, "Introduction to the Design And Analysis of Algorithms", Pearson Education, 2008.
2. Ian Goodfellow,Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016
3. Indra den Bakker, "Python Deep Learning Cookbook", Packt publisher, 2017
4. Wei Di, Anurag Bhardwaj, Jianing Wei, "Deep Learning Essentials" , Packt publishers, 2018

Web Resources:
1. http://nptel.ac.in/courses

Head Dept. of IT
CBIT, Hyderabad

20ITC25   **CLOUD COMPUTING**

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

Course Objectives:
1. Learn the fundamentals of cloud computing paradigm.
2. Learn various deployment and development models.
3. Learn various security concerns related to cloud.
4. Learn about various offerings of cloud service providers.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Understand the basic ideas of Cloud Computing and its services.
2. Analyze the architecture, deployment models and infrastructure models of Cloud Computing.
3. Realize distributed storage and performance for implementing virtualization.
4. Analyze cloud computing security, federation, presence, identity, and privacy.
5. Use IaaS / PaaS service offered by cloud service providers

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	3	-	-	-	-	-	3	-	-	3	3
CO4	3	3	3	3	-	3	-	-	-	3	-	-	-	3	-
CO5	3	3	3	3	3	-	-	-	3	3	3	-	-	3	3

UNIT-I
Introduction to Cloud Computing: Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Cloud, Features of a cloud, Software-as-a-Service, Platform-as-a-Service, Infrastructure-as-a- Service, Challenges and Risks.
Cloud Computing Platforms: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing.

UNIT-II
Service and Deployment Models: The promise of the cloud, the cloud service offerings and Deployment model, Challenges in the cloud.
Broad Approaches to Migrating into Cloud: Why Migrate? Deciding on cloud migration.
The Seven Step Model of Migration into Cloud: Migration Risks and Mitigation.
Managing Cloud Services: Organizational Issues
Administering Cloud Services: Service Level Agreements (SLA) and Monitoring Support, Billing and Accounting, Technical Interface, Managing Cloud Resources, Maintaining Connections.

UNIT-III
Web Services: SOAP/WSDL web services, REST web services, SOAP v/s REST

Head Dept. of IT
CBIT, Hyderabad

_____: Asynchronous 'rich' interfaces

_____: user interface services

Cloud Technologies: Study of Hypervisor

Virtualization Technology: Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization

_____: Multi-entity support, multi-schema approach, multi-tenance using cloud data stores, Data access control for enterprise applications.

UNIT-IV

Cloud Security Fundamentals: Vulnerability assessment tool for cloud, Privacy and Security in cloud.

Cloud Computing Security Architecture: Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control Identity management, Access control, Autonomic Security.

Cloud Computing Security Challenges: Virtualization security management virtual threats, VM Security Recommendations, VM-Specific Security techniques.

UNIT-V

Enterprise Cloud Computing Ecosystem: Introduction, Public Cloud Providers, Cloud Management Platforms and Tools, Tools for **Building** Private Cloud: IaaS using Eucalyptus, PaaS on IaaS –AppScale.

Roadmap for Enterprise Cloud Computing: Introduction, Quick wins using Public Clouds, Future of Enterprise Cloud Computing: Commoditization of the data center, Inter-operating Virtualized Data Centers, Convergence of private and public clouds, Generalized 'cloud' services.

Text Books:
1. Rajkumar Buyya, "Cloud Computing: Principles and Paradigms", First Edition, John Wiley & Sons.
2. Gautam Shroff, "Enterprise Cloud Computing: Technology, Architecture, Applications", First Edition,.Cambridge University Press.

Suggested Reading:
1. Barrie Sosinsky, "Cloud Computing Bible", First Edition, Wiley India,.
2. Tim Malhar, S.Kumaraswammy, S.Latif, "Cloud Security & Privacy", First Edition, O'Really Publications,.

Head Dept. of IT
CBIT, Hyderabad

20ADC15   **BIG DATA ANALYTICS LAB**

Instruction   3 L Hours per week
CIE   50 Marks
SEE   50 Marks
Credits   1.5

Course Objectives:
1. To provide the knowledge to set up a Hadoop Cluster and implement applications using MapReduce.
2. To introduce Pig, Pig Latin and HiveQL to process big data.
3. To get familiarized with the latest big data frameworks and writing applications using Spark and Scala.
4. To learn querying large datasets with SparkSQL.
5. To gain knowledge to work with NoSQL databases.

Course Outcomes:
Upon completing this course, students will be able to:
1. Explain Hadoop working environment and develop applications using MapReduce framework.
2. Develop scripts using Pig to solve real world problems and query the datasets using Hive.
3. Develop applications in Spark environment using RDDs.
4. Query real time data using SparkSQL.
5. Query large datasets using NoSQL.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	2	2	-	-	-	-	-	-	1	3	3	2
CO2	1	2	1	2	2	-	-	-	-	-	-	1	3	3	2
CO3	1	2	1	2	2	-	-	-	-	-	-	1	3	3	2
CO4	1	2	1	2	2	-	-	-	-	-	-	1	3	3	2
CO5	1	2	1	2	2	-	-	-	-	-	-	1	3	3	2

LIST OF PROGRAMS
1. Exploring and using basic HDFS commands.
2. Implement below applications using MapReduce on single node cluster
   (i) Word Count Application
   (ii) Analysis of Weather Dataset
   (iii) User Data Analysis
   (iv) Web Log Analysis
3. Working with Pig Latin Script and HiveQL.
4. Processing of large dataset on Spark framework and working with Spark SQL.
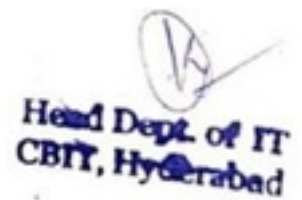5. Designing and modelling NOSQL databases with MongoDB.

Text Books:
1. Tom White, "Hadoop: The Definitive Guide", 4th Edition, O'Reilly Media Inc, 2015.
2. Bill Chambers, Matei Zaharia, "Spark: The Definitive Guide", 4th Edition, O'Reilly Media Inc, 2018
3. Tanmay Deshpande, "Hadoop Real-World Solutions Cookbook", 2nd Edition, Packt Publishing, 2016.

Head Dept. of IT
CBIT, Hyderabad

Suggested Reading:

1. Edward Capriolo, Dean Wampler, and Jason Rutherglen, "Programming Hive", O'Reilly Media Inc, October 2012.
2. Vignesh Prajapati, "Big data Analytics with R and Hadoop", Packt Publishing, November 2013.

Web Resources:

1. https://parthgoelblog.wordpress.com/tag/hadoop-installation
2. http://www.iitr.ac.in/media/facspace/patelfec/16Bit/index.html
3. https://class.coursera.org/datasci-001/lecture
4. http://bigdatauniversity.com

Head Dept. of IT
CBIT, Hyderabad

20ITC26   **EMBEDDED SYSTEMS AND IOT LAB**

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

Course Objectives:

1. To familiarize students with Embedded Programming.
2. To Experiment with On-Boarding Raspberry Pi / Arduino.
3. To Programming with Raspberry Pi Pins / Arduino Pins using sensors.
4. To introduce the concept of cloud data in IoT environment.
5. To Understand IoT Applications in real time scenario.

Course Outcomes:

Upon completing this course, students will be able to:

1. Develop Embedded System using 8051 in Embedded 'c'
2. Implement Python scripts that run on Raspberry Pi/Arduino.
3. Build IoT Applications using sensors.
4. Demonstrate Read and write cloud data using Thing speak.
5. Interpret the Case studies in different domains.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	2	3	3	-	-	-	-	-	-	3	3	2
CO2	2	1	1	2	3	3	-	-	-	-	-	-	3	3	2
CO3	2	1	-	2	3	3	-	-	-	-	-	-	3	3	2
CO4	2	1	-	2	3	3	2	1	1	1	2	1	3	3	2
CO5	2	1	1	2	3	3	2	1	1	1	1	1	3	-	-

LIST OF PROGRAMS

1. Interface Input-Output and other units such as: Relays, LEDs, Switches, Stepper Motors using 8051 Micro controllers.

2. Study and Configure Raspberry Pi.

3. Write programs using Raspberry Pi to blink LED.
   a)Using loops b)Using conditional & control statements

4. Write program using Raspberry Pi to interface LEDs, Switch and Buzzer.

5. Interface different Sensors using Raspberry Pi.
   a) Temperature & Humidity b) PIR c) GAS d) LDR d) Rain e) Soil moisture.

6. Write a program to monitor temperature and humidity using DHT (Digital Humidity and Temperature) sensor using Raspberry Pi / Arduino.

7. Uploading and reading the Cloud data using Thing speak platform.

Text Books:
1. Kenneth J.Ayala, "The 8051 Microcontroller", 3rd Edition, Thomson, 2014.
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 2014.
3. Misra, C. Roy, and A. Mukherjee, 2020 "Introduction to Industrial Internet of Things and Industry 4.0". CRC Press.

Suggested Reading:
1. Raj Kamal, "Embedded Systems", 2nd Edition, McGraw Hill, 2015.
2. Samuel Greengard, "The Internet of Things", 1st Edition, MIT Press, 2015.
3. Peter Waher, Pradeeka Seneviratne, Brian Russell, Drew Van Duren, "IoT: Building Arduino-Based Projects", 1st Edition, Packt Publishing Ltd, 2016.
4. Jeeva Jose, "Internet of Things", Khanna Book Publishing Company

Head Dept. of IT
CBIT, Hyderabad

20ITC27

(Deep Learning Lab)

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

Course Objectives:
1. To enable students to practice learning by doing.
2. To develop capability to analyse and solve real world problems.
3. To inculcate critical thinking and active experimentation of students.
4. To impart team building and management skills among students.
5. To instill writing and presentation skills for the project.

Course Outcomes:
Upon completing this course, students will be able to:
1. Define a project proposal by interpreting real time scenarios and the Literature.
2. Plan, analyse, Design and implement a project.
3. Develop solution of the identified problem with the help of modern technologies
4. Work as a team and develop a collaborative learning environment.
5. Prepare and submit the Report and deliver a presentation before the departmental Committee.

Minor Project is aimed to enable the students to develop a product/application based on the course **Deep Learning**, Course code - **20ADC10**. The student has to implement and present the project as per the given schedule. Report of the project work has to be submitted for evaluation.

Schedule

S No	Description	Duration
1.	Data Collection, Pre-processing and Feature Computation of different types of data.	2 weeks
2.	Developing and Tuning various CNN Models	3 weeks
3.	Developing and Tuning various RNN models	2 weeks
4.	Problem Identification & Abstract preparation	1 week
5	Implementation and inferences	3 weeks
6.	Documentation and Project Presentation	2 weeks

Guidelines for the Award of Marks

S No	Description	Max. Marks
	Final Assessment	**30**
1.	PPT Preparation	10
2.	Technical Content	10
3.	Question and Answers	5
4.	Report Preparation	5

Head Dept. of IT
CBIT, Hyderabad

Note: Final Assessment for Minor Project is to be done for the entire class by a panel of all the faculty handling Minor Project for that class.

Head Dept. of IT
CBIT, Hyderabad

20EGCO3   EMPLOYABILITY SKILLS
                    (BE/BTech V & VI semester - Common to all Branches)

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

Course Objectives:
1. Learn the art of communication, participate in group discussions and case studies with confidence and to make effective presentations.
2. With- resume packaging, preparing them to face interviews.
3. Build an impressive personality through effective time management, leadership qualities, self-confidence and assertiveness.
4. Understand professional etiquette and to make them learn academic ethics and value system.
5. To be competent in verbal aptitude.

Course Outcomes:
Upon successful completion the students will be able to:
1. Become effective communicators, participate in group discussions with confidence and be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals, learn to manage time effectively and deal with stress.
4. Make the transition smoothly from campus to work, use media with etiquette and understand the academic ethics.
5. Enrich their vocabulary, frame accurate sentences and comprehend passages confidently.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	-	-	-	-	-	-	-	-	2	2	2	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	-	2	-	-	-	-	-	2		-	2	-	-	-
CO 5	-	-	-	-	-	2	-	-	-	-	-	-	-	-

UNIT-I
Verbal Aptitude: Error Detection, Articles, Prepositions, Tenses, Concord and Transformation of Sentences- Jumbled Words/Sentences- Vocabulary, Synonyms, Antonyms, One Word Substitutes, Idioms and Phrases, Word/Sentence/Text Completion- Reading Comprehension.

Group Discussion & Presentation Skills: Dynamics of Group Discussion-Case Studies- Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Accuracy, Coherence. Elements of Effective Presentation – Structure of a Presentation – Presentation tools – Body language - Preparing an Effective PPT

Behavioral Skills: Personal strength analysis-Effective Time Management- Goal Setting- Stress management-

43

Head Dept. of IT
CBIT, Hyderabad

Corporate Culture – Grooming and etiquette-Statement of Purpose (SOP).

Mini Project: Research-Hypothesis-Developing a Questionnaire-Data Collection-Analysis-General and Technical Report - Writing an Abstract –Technical Report Writing-Plagiarism-Project Seminar.

Interview Skills: Cover Letter andRésumé writing – Structure and Presentation, Planning, Defining the Career Objective, Projecting ones Strengths and Skill-sets – Interviews: Concept and Process, Pre-Interview Planning, Opening Strategies, Answering Strategies, Mock Interviews.

Suggested Reading:
1. Leena Sen, "Communication Skills", Prentice-Hall of India, 2005
2. Dr. Shalini Verma, "Body Language - Your Success Mantra", S Chand, 2006
3. Edgar Thorpe and ShowickThorpe , "Objective English", 2nd edition, Pearson Education, 2007
4. Ramesh, Gopalswamy, and Mahadevan Ramesh, "The ACE of Soft Skills", New Delhi: Pearson, 2010
5. Gulati and Sarvesh, " Corporate Soft Skills", New Delhi: Rupa and Co. , 2006
6. Van Emden, Joan, and Lucinda Becker, "Presentation Skills for Students", New York: Palgrave Macmillan, 2004
7. A Modern Approach to Verbal & Non-Verbal Reasoning by R S Aggarwal, 2018
8. Covey and Stephen R, "The Habits of Highly Effective People", New York: Free Press, 1989

Head Dept. of IT
CBIT, Hyderabad

20ADE03 **NATURAL LANGUAGE PROCESSING**
(Professional Elective –3)

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

Course Objectives:
1. To understand the steps involved in Natural language processing
2. To learn about the lexical, syntactic and semantic analysis of natural language processing
3. To explore the various parsing techniques for natural languages
4. To understand the statistical models for Natural language processing
5. To learn about the various applications involved in Natural language processing

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Justify the various steps necessary for processing natural language
2. Suggest appropriate semantic modeling and sequence labeling techniques for a particular application.
3. Apply appropriate neural network based models for a contextual application
4. Analyse existing encoder-decoder models and information extraction techniques.
5. Identify the significance of word net and analyze the applications of Natural Language Processing such as Question Answering and chatbots.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	1	1	-	-	-	1	1	1	1	3	-	3
CO2	2	1	2	1	2	-	-	-	-	-	1	-	2	-	3
CO3	2	1	2	2	1	-	-	-	-	-	-	-	3	-	3
CO4	2	1	1	1	1	-	-	-	-	-	-	1	1	-	3
CO5	2	1	1	1	1	-	-	-	-	-	-	1	1	-	3

UNIT-I
Introduction: Regular Expressions**,** Text Normalization, Edit Distance**, N-gram Language Models**: N-Grams, Evaluating Language Models, Sampling sentences from a language model, Generalization and Zeros, Smoothing, Kneser-Ney Smoothing

UNIT-II
Vector Semantics and Embeddings: Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Pointwise Mutual Information (PMI), Applications of the tf-idf or PPMI vector models, Word2vec, Visualizing Embeddings, Semantic properties of embeddings, Bias and Embeddings, Evaluating Vector Models.
Sequence Labeling for Parts of Speech and Named Entities: English Word Classes, Part-of-Speech Tagging, Named Entities and Named Entity Tagging, HMM Part-of-Speech Tagging, Conditional Random Fields (CRFs), Evaluation of Named Entity Recognition

Head Dept. of IT
CBIT, Hyderabad

UNIT-III

Deep Learning Architectures for Sequence Processing: Language Models Revisited, Recurrent Neural Networks, RNNs as Language Models, RNNs for other NLP tasks, Stacked and Bidirectional RNN architectures, The LSTM, Self-Attention Networks: Transformers, Transformers as Language Models, Contextual Generation and Summarization. Case study in NLP.

Machine Translation and Encoder-Decoder Models: Language Divergences and Typology, The Encoder-Decoder Model, Encoder-Decoder with RNNs, Attention, Beam Search, Encoder-Decoder with Transformers, Some practical details on building MT systems, MT Evaluation, Bias and Ethical Issues

UNIT-IV

Constituency Grammars-Constituency, Context-Free Grammars, Some Grammar Rules for English. Some Grammar Rules for English, Grammar Equivalence and Normal, Lexicalized Grammars. **Constituency Parsing-**Ambiguity**,** CKY Parsing: A Dynamic Programming Approach, Span-Based Neural Constituency Parsing, Evaluating Parsers, Partial Parsing, CCG Parsing. **Dependency Parsing**-Dependency Relations, Dependency Formalisms, Dependency Treebanks, Transition-Based Dependency Parsing, Graph-Based Dependency Parsing, Evaluation

UNIT-V

t: Word Senses, Relations Between Senses, WordNet: A Database of Lexical Relations, Word Sense Disambiguation, Alternate WSD algorithms and Tasks, Using Thesauruses to Improve Embeddings, Word Sense Induction. **Question Answering:** Information Retrieval, IR-based Factoid Question Answering, Entity Linking, Knowledge-based Question Answering, Using Language Models to do QA, Classic QA Models, Evaluation of Factoid Answers. **Introduction to Chatbots-Chatbots, GUS:** Simple Frame-based Dialogue Systems, The Dialogue-State Architecture, Evaluating Dialogue Systems, Dialogue System Design

Text Books:
1. Jurafsky Daniel, Martin James, "Speech and Language Processing", 3rd Edition, Pearson Education, 2021.
2. Christopher Manning, Schutze Heinrich, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.

Suggested Reading:
1. Allen James, "Natural Language Understanding", 2nd Edition, Benjamin Cumming, 1995.
2. Charniack Eugene, "Statistical Language Learning", MIT Press, 1993.

Web Resources:
1. http:// archive.nptel.ac.in/courses/106/105/106105158/
2. http:// archive.nptel.ac.in/courses/106/106/106106211

Head Dept. of IT
CBIT, Hyderabad

20ITE10   **DATA COMPRESSION**
                                              (Professional Elective –3)

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

Course Objectives:
1. To introduce the basic applications, concepts, and techniques of Data Compression
2. To familiarize the concepts of Huffman Coding and arithmetic coding
3. To introduce the dictionary approach in compression
4. To learn different concepts of compression techniques
5. To Study different types of quantization techniques

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Understand the Mathematical Preliminaries involved in compression techniques.
2. Analyze Hoffman and Arithmetic coding for Lossless image compression, Text compression, and Audio Compression
3. Apply LZ77, LZ78 dictionary-based compression techniques.
4. Identify appropriate Lossless and Lossy algorithms for compression of given digital information.
5. Evaluate scalar and vector quantization techniques

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	-	2	-	-	-	-	-	-	-	1	-	-	2
CO2	2	2	1	1	1	-	-	-	-	-	-	2	2	3	3
CO3	3	2	1	2	2	-	-	-	-	-	1	2	2	3	2
CO4	3	3	1	2	2	-	-	-	-	-	1	2	2	3	2
CO5	3	2	1	2	2	-	-	-	-	-	1	2	2	3	2

UNIT-I
Introduction: Compression Techniques, Modeling and Coding **Mathematical Preliminaries for Lossless Compression:** Models- Physical Models, Probability Models, Markov Models Coding- Uniquely Decodable Codes, Prefix codes.
Huffman coding: The Huffman Coding Algorithm- Minimum variance Huffman codes, Adaptive Huffman coding- Update Procedure, Encoding Procedure, Decoding Procedure, Golomb Codes, Rice codes, Tunstall Codes, Applications of Huffman Coding- Lossless Image compression, Text compression, Audio Compression.

UNIT-II
Arithmetic coding: Coding a sequence- Generating a Tag, Deciphering the Tag, Generating Binary Code- Uniqueness and Efficiency of the Arithmetic code, Algorithm implementation, Integer Implementation, Comparison of Huffman and Arithmetic coding, Applications.

UNIT-III
Dictionary Techniques: Static Dictionary- Diagram Coding, Adaptive Dictionary- The LZ77 approach, The LZ78 Approach, Applications- File and Image Compression.

Head Dept. of IT
CBIT, Hyderabad

UNIT-IV
Context based Compression: Prediction with partial match(ppm)- The Basic Algorithm, The Escape symbol, Length of context, The Exclusion Principle.
Lossless Image Compression: The Old JPEG Standard, CALIC, JPEG-LS.

UNIT-V
Scalar Quantization: The Quantization Problem, Uniform Quantizer, Adaptive Quantization- Forward Adaptive, Backward Adaptive, Nonuniform Quantization- pdf optimized Quantization, Companded Quantization.
Vector Quantization: Advantages of Vector Quantization over Scalar Quantization, Tree structured Vector Quantization, Structured Vector Quantization.

Text books:
1. Khalid Sayood, "Introduction to Data Compression", 5th Edition, Morgan Kaufmann Publishers, 2017.
2. Mark Nelson, Jean Loup Gaily, "The Data Compression book", 2nd Edition, M&T Books, 1996.

Suggested Reading:
1. David Salomon, D. Bryant, Giovanni Motta, "Handbook of Data Compression, 5th Edition, Springer Publishers, 2010.
2. James A. Storer, "Data Compression Methods and Theory", Computer Science Press, 1987
3. Colt McAnlis and Aleks Haecky, "Understanding Compression", 1st Edition, O'reilly, 2016
4. Ida Mengyi Pu, "Fundamental Data Compression", 1st Edition, Elsevier Science Publishers, 2006

Web Resources:
1. http://www.data-compression.info/index.html
2. https://www.cs.cmu.edu/~guyb/realworld/compression.pdf

Head Dept. of IT
CBIT, Hyderabad

20ADE06   **MICROSERVICES WITH SPRING BOOT**
                                     (Professional Elective –3)

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

Course Objectives:
1. To Understand the basic concepts of the Spring Framework
2. To provide basic knowledge of Web Application Development with Spring Boot and Restful APIs
3. To explore data access with Spring's DAO Module
4. To acquire Knowledge of Spring transaction management
5. To study Spring's unit testing framework and Introduce Spring Security with Rest API

Course Outcomes:
Upon completing this course, students will be able to:
1. Acquire the basic concepts of the Spring Framework
2. Interact with databases using Spring's support for JDBC and JPA.
3. Build spring boot applications using Dependency Injection concept
4. Apply Transaction Management concepts of spring in Enterprise Application Development and develop the Spring-MVC based Applications to solve the real-world problems.
5. Use Spring Unit testing framework and configure security on Spring MVC Applications

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	1	1	-	-	-	1	1	1	1	3	3	3
CO2	2	1	2	1	2	-	-	-	-	-	1	-	2	3	3
CO3	2	1	2	2	1	-	-	-	-	-	-	-	3	3	3
CO4	2	1	1	1	1	-	-	-	-	-	-	1	1	3	3
CO5	2	1	1	1	1	-	-	-	-	-	-	1	1	3	3

UNIT-I
Spring Overview: Introduction to Spring Framework, The DI Container, Evolution of Spring Framework.

Java Configuration: Java configuration and the Spring application context, @Configuration and @Bean annotations, @Import: working with multiple configuration files, defining bean scopes, launching a Spring Application and obtaining Beans, External properties & Property sources, Environment abstraction, Using bean profiles, Spring Expression Language (SpEL).

Annotation and Component Scanning: Component scanning, Autowiring using @Autowired, Java configuration versus annotations mixing Lifecycle annotations: @PostConstruct and @PreDestroy, Stereotypes and meta-annotations.

UNIT-II
Web Applications with Spring Boot: Introduction to Spring MVC and request processing, Controller method signatures, Using @Controller, @RestController and @GetMapping annotations and Configuring Spring MVC with Spring Boot.

Head Dept. of IT
CBIT, Hyderabad

Spring Boot: An introduction to the REST architectural style, Controlling HTTP response codes with @ResponseStatus, Implementing REST with Spring MVC, @RequestMapping, @RequestBody and @ResponseBody, Spring MVC's HttpMessageConverters and automatic content negotiation and Jakson library.

UNIT-III

Spring Boot Feature Introduction:

Introduction to Spring Boot Features, Value Proposition of Spring Boot and Creating a simple Boot application using Spring Initializer website.

Spring Boot – Dependency Management:

Dependency management using Spring Boot starters, how auto-configuration works, Configuration properties, overriding auto-configuration and Using CommandLineRunner.

UNIT-IV

JDBC Simplification with JdbcTemplate: How Spring integrates with existing data access technologies, Spring's JdbcTemplate and DataAccessException hierarchy.

Spring Boot – Spring Data JPA: Quick introduction to ORM with JPA, Benefits of using Spring with JPA, JPA configuration in Spring, Configuring Spring JPA using Spring Boot, Spring Data JPA dynamic repositories.

Transaction Management with Spring: Transaction overview, Transaction management with Spring, Transaction propagation and rollback rules and Transactions and integration testing.

UNIT-V

Testing a Spring-based Application: Spring and Test-Driven Development, Spring 5 integration testing with JUnit 5, Application context caching and the @DirtiesContext annotation, Profile selection with @ActiveProfiles, Easy test data setup with @Sql.

Securing REST Application with Spring Security: What problems does Spring Security solve? , Configuring authentication, implementing authorization by intercepting URLs, Authorization at the Java method level, Understanding the Spring Security filter chain and Spring security testing.

Actuators, Metrics and Health Indicators: Exposing Spring Boot Actuator endpoints, Custom Metrics, Health Indicators, Creating custom Health Indicators and External monitoring systems.

Text Books:
1. Mark Heckler, "Spring Boot Up and Running, 1st Edition", Oreilly, 2021.
2. Iuliana Cosmina, Rob Harrop, Chris Schaefer, Clarence Ho, " Pro String 5", 5th Edition, Apress, 2019

Suggested Reading:
1. Raja CSP Raman, Ludovic Dewailly, "Building A RESTful Web Service with Spring 5", Packt Publishing, 2018.

Web Resources:
1. https://spring.io/guides/gs/spring-boot/
2. https://docs.spring.io/spring-framework/docs/current/reference/html/index.html

20ITE11   **ETHICAL HACKING**

(Professional Elective –3)

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

Course Objectives:
1. To present Information security threats & countermeasures
2. To perform security auditing & testing
3. To impart knowledge on issues relating to ethical hacking
4. To present network defense measures
5. To familiarize penetration and security testing issues

Course Outcomes:
Upon successful completion of this course, a student will be able to:
1. Identify the vulnerabilities/threats/attacks.
2. Describe penetration & security testing.
3. Interpret safe penetration techniques on the World Wide Web.
4. Design a computer against a variety of security attacks using various tools.
5. Become a professional ethical hacker.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	3	-	3	-	-	2	-	3	3	1
CO2	2	3	1	2	3	3	-	3	-	-	-	-	3	3	1
CO3	2	2	1	-	-	3	-	3	-	-	-	-	3	3	1
CO4	2	3	1	2	3	3	-	3	-	-	-	-	3	3	1
CO5	2	1	1	2	-	3	-	3	-	-	2	-	3	3	1

UNIT–I
Ethical Hacking Overview & Vulnerabilities: Understanding the importance of security, Concept of ethical hacking and essential Terminologies- Threat, Attack, Vulnerabilities, Target of Evaluation, Exploit. Phases involved in hacking.

UNIT–II
Footprinting & Port Scanning: Footprinting - Introduction to foot printing, Understanding the information gathering methodology of the hackers, Tools used for the reconnaissance phase. Port Scanning - Introduction, using port scanning tools, ping sweeps, Scripting Enumeration-Introduction, Enumerating windows OS & Linux OS.

UNIT–III
System Hacking: Aspect of remote password guessing, Role of eavesdropping ,Various methods of password cracking, Keystroke Loggers, Understanding Sniffers ,Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing.

UNIT–IV

Head Dept. of IT
CBIT, Hyderabad

Hacking Web Services & Session Hijacking: Web application vulnerabilities, application coding errors, SQL injection into Back-end Databases, cross-site scripting, cross-site request forging, authentication bypass, web services and related flaws, protective http headers Understanding Session Hijacking, Phases involved in Session Hijacking, Types of Session Hijacking, Session Hijacking Tools.

UNIT–V
Hacking Wireless Networks: Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks.

Text Book:
1. Kimberly Graves, "Certified Ethical Hacker", Wiley India Pvt Ltd, 2010

Suggested Reading:
1. Michael T. Simpson, "Hands-on Ethical Hacking & Network Defense", Course Technology, 2010
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Media, Second Revised Edition, 2013
3. Rajat Khare, "Network Security and Ethical Hacking", Luniver Press, 2006
4. Ramachandran V, "BackTrack 5 Wireless Penetration Testing Beginner's Guide", 3rd Edition, Packt Publishing, 2011
5. Thomas Mathew, "Ethical Hacking", OSB publishers, 2003

Web Resources:
1. https://www.elsevier.com/books/cyber-security-awareness-forlawyers
2. https://www.coursera.org/specializations/ethical-hacking
3. https://nptel.ac.in/courses

Head Dept. of IT
CBIT, Hyderabad

20ITE12   **AGILE METHODOLOGIES**
                         (Professional Elective –3)

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

Course Objectives:
1. To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
2. To provide a good understanding of software design and a set of software technologies and APIs.
3. To do a detailed examination and demonstration of Agile development and testing techniques.
4. To understand the benefits and pitfalls of working in an Agile team.
5. To understand Agile development and testing.

Course Outcomes:
Upon successful completion of this course, students will be able to:
1. Compare Agile model with traditional models and explain the principles of agile model.
2. Perform iterative agile software processes.
3. Analyze the impact of agile knowledge management in the software development process.
4. Realize the importance of interacting with business stakeholders in determining the requirements for agile software system.
5. Develop techniques and tools for improving team collaboration and agile software quality.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	1	-	-	-	1	-	-	1	2	-	-
CO2	2	1	1	-	1	-	-	-	-	-	-	1	1	-	-
CO3	2	2	1	-	-	-	-	-	-	-	2	2	2	-	2
CO4	2	1	-	-	-	-	-	-	-	-	-	2	2	-	3
CO5	2	1	-	-	-	-	-	-	1	-	-	2	2	-	3

UNIT-I
Agile Methodology: Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values.

UNIT–II
Agile Processes: Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT–III
Agility And Knowledge Management: Agile Information Systems – Agile Decision Making - Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment, Leveraging – KM in Software Engineering – Managing Software Knowledge –

53

Head Dept. of IT
CBIT, Hyderabad

Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story Card Maturity Model(SMM).

Head Dept. of IT
CBIT, Hyderabad

UNIT–IV

Agility And Requirements Engineering: Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT-V

Agility And Quality Assurance: Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

Text Books:
1. David J. Anderson and Eli Schragenheim, "Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results", Prentice Hall, 2003.
2. Hazza and Dubinsky, "Agile Software Engineering, Series: Undergraduate Topics in Computer Science", Springer, 2009.

Suggested Reading:
1. Craig Larman, "Agile and Iterative Development: A Managerial Guide", Addison-Wesley, 2004.
2. 2. Kevin C. Desouza, "Agile Information Systems: Conceptualization, Construction, and Management", Butterworth-Heinemann, 2007.

Web Resource:
1. https://www.coursera.org/specializations/agile-development

Head Dept. of IT
CBIT, Hyderabad

20EGM03   **UNIVERSAL HUMAN VALUES-II: UNDERSTANDING HARMONY**
(**B.E/B.Tech II/III Year** -Common to all branches)

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

Introduction

This course discusses the role of human values in one's family, in society and in nature. In the Induction Program, students would get an initial exposure to human values through Universal Human Values–I. This exposure is to be augmented by this compulsory full semester foundation course.

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 human being, family, society and nature/existence.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes:
Upon successful completion of the 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 sustainable solutions, 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.

Mapping of Course Outcomes with Program Outcomes and Program Specific Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	2	2	2	-	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 4	-	2	-	-	-	-	-	2	-	-	2	-	-	-	-
CO 5	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-

UNIT-I

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

- Purpose and motivation for the course, recapitulation from Universal HumanValues-I
- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration

56

- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment 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.

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 fulfilment 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.

UNIT-IV

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence
- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment 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.

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

Head Dept. of IT
CBIT, Hyderabad

Assessment:

This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self- assessment, peer assessment etc. will be used in evaluation. Example:

Assessment by faculty mentor: 10 marks Self-
assessment/Assessment by peers: 10 M
Socially relevant project/Group Activities/Assignments: 20 marks
Semester End Examination: 60 marks
The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.

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 The teacher's manual

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. ISBN978-93-87034-53-2

Suggested Readings:
1. A Nagaraj Jeevan Vidya: EkParichaya, Jeevan Vidya Prakashan, Amar kantak,1999.
2. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi,2004.
3. Cecile Andrews, Slow isBeautiful
4. Gandhi - Romain Rolland (English)
5. Dharampal, "Rediscovering India"
6. E. FSchumacher. "Small isBeautiful"
7. J. C. Kumarappa "Economy ofPermanence"
8. Pandit Sunderlal "Bharat Mein AngrejiRaj"
9. Mohandas Karamchand Gandhi "The Story of My Experiments withTruth"
10. 10.Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
11. Maulana Abdul Kalam Azad, India Wins Freedom-
12. Vivekananda - Romain Rolland(English)
13. The Story of Stuff(Book)

Head Dept. of IT
CBIT, Hyderabad

58