SEMESTER I

U19LE101	BASIC ENGLISH	Category: HS			
		L	T	P	C
		1	0	2	2

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To read the text, understand and write the meaning under Technical, Business, Social and Academic contexts.
- To listen and comprehend monologues, dialogues and discussions.
- To speak effectively with appropriate use of words and participate in discussions.

UNIT I BASICS FOR COMMUNICATION 9

Regular & Irregular Verbs – Modal Verbs – Prepositions – Tenses – Subject Verb Agreement – Spotting Errors – Homonyms & Homophones – Phrasal Verbs – Single word substitute – Word formation – Reported Speech

UNIT II LISTENING 9

Listening for specific Information – Listening to short texts – Listening to product description and process – Listening to formal and informal Conversations – Listening to announcements – Listening Comprehension

UNIT III SPEAKING 9

Introducing oneself – Seeking and sharing information – JAM – Enquiry – Asking for clarification – Describing a place, person, process, product and experience – Current affairs – Making presentations

UNIT IV READING 9

Reading for information – Skimming – Scanning – Predicting the content – Reading comprehension – Reading short texts – Proof reading(editing)

UNIT V WRITING 9

Memo – Email – Letter writing (formal and informal) – Dialogue writing – Descriptive writing – Instructions – Filling forms of application - Paraphrasing

LIST OF EXPERIMENTS

1. Listening for information
2. Listening to announcements
3. Listening to stories
4. Song based listening
5. Listening to conversations
6. Self Introduction
7. Just a Minute
8. Story narration
9. Picture description
10. Movie review

Contact Periods:

Lecture: 15 Periods Tutorial: – Periods Practical: 30 Periods Total: 45 Periods

TEXT BOOKS:

1. Mindscapes: “English for Technologist and Engineers”, Orient BlackSwan, 2014
2. Sudharshana N P and Savitha C, “English for Technical Communication”, Cambridge University Press, 2016

REFERENCES:

1. Murphy, Raymond, “Intermediate English Grammar”, Cambridge University Press, 2009
2. Means, Thomas L, “English and Communication for Colleges”, Cengage 2017
3. “Using English: A Coursebook for Undergraduate Engineers and Technologists” Orient BlackSwan, 2017

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Use appropriate vocabulary required for spoken and written communication	Remember
CO2	Comprehend and answer questions and take part in conversations	Understand
CO3	Participate in discussions and presentations	Apply
CO4	Understand the meaning of the content present in letters, reports and newspaper	Understand
CO5	Draft letters, e-mails and make notes with appropriate use of words	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO2	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO3	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO4	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO5	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO	-	-	-	-	-	2	1	-	3	3	-	-	-	-
Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)														

SEMESTER I

U19LE102	COMMUNICATIVE ENGLISH	Category: HS			
		L	T	P	C
		1	0	2	2

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To develop the ability to read, write and comprehend various texts.
- To enhance the listening skills to understand conversations and deliberations on diverse contexts.
- To make effective presentations and demonstrate concepts within a team.

UNIT I BASICS FOR COMMUNICATION 9

Active and Passive – Conditionals – Reported speech – Degrees of comparison – Phrases and clauses – Idioms – Kinds of sentences – Connectives and Discourse markers – Purpose statements

UNIT II LISTENING 9

Listening to TED talks – Listening to product description – Listening to orations – Listening to news – Radio based listening

UNIT III SPEAKING 9

Group discussion – Extempore – Technical seminar – Product and process description – Role play – Conversation and etiquettes – Short group conversation – Narrating a story – Formal and informal discussions

UNIT IV READING 9

Pre-reading and Post-reading – Intensive reading – Extensive reading – Newspaper reading – Reading longer texts – Reviewing company profile – Reading strategies – Interpreting visual graphics

UNIT V WRITING 9

Interpreting charts and graphs – Recommendations – Minutes of meeting – Job application and cover letter – Report writing – Drafting circulars (Business contexts)

LIST OF EXPERIMENTS

1. Listening to TED talks
2. Listening to product description
3. Listening to news
4. Radio based listening
5. Listening to oration
6. Self-Introduction
7. Role play
8. Extempore
9. Presentation
10. Group discussion

Contact Periods:

Lecture: 15 Periods Tutorial: – Periods Practical: 30 Periods Total: 45 Periods

TEXT BOOKS:

1. Mindscapes: English for Technologist and Engineers", Orient BlackSwan, 2014
2. Sudharshana N P and Savitha C, "English for Technical Communication", Cambridge University Press, 2016

REFERENCES:

1. Murphy, Raymond, "Intermediate English Grammar", Cambridge University Press, 2009.
2. Means, Thomas L, "English and Communication for Colleges", Cengage 2017.
3. "Using English: A Coursebook for Undergraduate Engineers and Technologists" Orient BlackSwan, 2017.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Make use of relevant vocabulary in formal and informal contexts	Apply
CO2	Infer and exhibit the ability to listen various professional interactions	Understand
CO3	Express views and perceptions in a technical forum	Understand
CO4	Interpret a given text and relate the content effectively	Understand
CO5	Frame coherent and cohesive sentences in select contexts	Understand

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO2	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO3	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO4	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO5	-	-	-	-	-	2	1	-	3	3	-	-	-	-
CO	-	-	-	-	-	2	1	-	3	3	-	-	-	-
Correlation levels:	1: Slight (Low)					2: Moderate (Medium)					3: Substantial (High)			

SEMESTER I

U19MA101	CALCULUS AND DIFFERENTIAL EQUATIONS *(Common to all Branches)*	Category: BS			
		L	T	P	C
		3	1	0	4

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To apply the concepts of matrices to solve engineering problems
- To acquire knowledge in the areas of total derivatives and partial derivatives
- To introduce the concepts of improper integrals, Gamma and Beta functions and also make the student gain familiarity about the techniques of solving ordinary differential equations

UNIT I MATRICES 9 +3

Characteristic equation–eigenvalues and eigenvectors –Properties (without proof)–Cayley hamilton theorem (without proof) – applications –- Diagonalization using orthogonal transformation–Reduction of quadratic form to canonical form by orthogonal transformation–Applications of eigenvalues and eigenvectors: Electrical circuit–-Mass string problems.

UNIT II DIFFERENTIAL CALCULUS 9+3

Curvature – radius of curvature – center– circle of curvature – evolute and envelope of plane curves.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial derivatives-total derivative – Jacobians – expansion and extreme values of functions of two variables – Lagrange multipliers method.

UNIT IV INTEGRAL CALCULUS 9+3

Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals – surface areas – volume of revolutions.

UNIT V ORDINARY DIFFERENTIAL EQUATIONS 9+3

Second and Higher order linear differential equations with constant coefficients– variable coefficients – Euler Cauchy equation– Legendre equation – Method of variation of parameters – solution of simultaneous equations of first order-Applications: Electrical circuits – Simple harmonic motion-chemical reactions.

Contact Periods:

Lecture: 45 Periods Tutorial: 15 Periods Practical: – Periods Total: 60 Periods

TEXT BOOKS:

1. Erwin Kreyszig, “Advanced Engineering Mathematics”, Wiley India Pvt Ltd, New Delhi, (2018).
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, (2017).

REFERENCES:

1. N.P.Bali and Manish Goyel, A text book of Engineering Mathematics, Laxmi Publications; Twelfth edition (2016).
2. G.B.Thomas and R.L Finney, Calculus and Analytic Geometry, Pearson Education India; 9th edition (30 January 2010).
3. Maurice d. Weir, Joel Hass, Christopher Heil, “Thomas Calculus”, Pearson Education, Uttar Pradesh, (2018).
4. David C Lay, Linear Algebra and its Applications, Addison-Wesley, Boston, (2016).
5. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, (2015).
6. https://pvpsitrealm.blogspot.com/2016/09/higher-engineering-mathematics-by-bs.html
7. www.r-5.org/.../linear-algebra/David_LayLinear_Algebra_and_Its_ApplicationsEN.pd
8. www.polo.ufsc.br/fmanager/polo2016/materiais/arquivo38_1.pdf

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Apply eigenvalues and eigenvectors ideas in engineering field.	Apply
CO2	Determine curvature, evolutes and envelope of plane curves.	Apply
CO3	Expand and find extreme values of functions of two variables using Lagrange multiplier method.	Apply
CO4	Solve problems on improper integrals using Gamma and Beta functions.	Apply
CO5	Solve higher order ordinary differential equations and application problems.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	1	-	-	2	-	-
CO2	3	2	-	-	-	-	-	-	1	-	-	2	-	-
CO3	3	2	-	-	-	-	-	-	1	-	-	2	-	-
CO4	3	2	-	-	-	-	-	-	1	-	-	2	-	-
CO5	3	2	-	-	-	-	-	-	1	-	-	2	-	-
CO	3	2	-	-	-	-	-	-	1	-	-	2	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER I

U19PH103	ENGINEERING PHYSICS (AD)	Category: BS			
		L	T	P	C
		3	0	0	3

PRE–REQUISITES:

- Higher Secondary Physics

COURSE OBJECTIVES:

- To acquire the knowledge of electron transport properties in conductors and semiconductors
- To understand the types of magnetic, superconducting materials and its applications
- To gain the knowledge of quantum structures and smart materials for engineering applications

UNIT I CONDUCTING MATERIALS 9

Classical free electron theory– Expression for electrical conductivity – Expression for Thermal conductivity – Wiedemann - Franz law – Success and failures– Electrons in metals – Fermi-Dirac statistics – Fermi distribution function– Effect of temperature – Density of energy states – Energy bands in solids (Qualitative)

UNIT II SEMICONDUCTING MATERIALS 9

Introduction – Direct and indirect band gap semiconductors – Intrinsic semiconductors – Carrier concentration in intrinsic semiconductors – Law of mass action – Extrinsic semiconductors – Carrier concentration in N-type semiconductor – P-type semiconductor(qualitative) – Variation of Fermi level with temperature – Hall effect – Determination of Hall coefficient – Applications

UNIT III MAGNETIC MATERIALS 9

Magnetic dipole – Magnetic permeabillity – Susceptibility – Classification of magnetic materials(dia,para and ferro) – Ferromagnetism – Domain theory – Hysteresis – Hard and soft magnetic materials – Ferrites – Structure – Applications – Magnetic principles in data storage devices – Magnetic bubble memories – Magnetic hard disc drives (GMR sensor)

UNIT IV SUPERCONDUCTING MATERIALS 9

Superconductors – Meissner effect – Persistent current – Critical temperature – Critical magnetic field – Isotope effect – Type I, Type II superconductors – Cooper pair – BCS theory of Superconductivity – High temperature superconductors – SQUID – Cryotron – Magnetic levitation

UNIT V QUANTUM STRUCTURES AND SMART MATERIALS 9

Introduction – Electron density in bulk material – Size dependence of Fermi energy – Quantum confinement – Quantum structures – Metallic glasses – Properties,preparation and applications – SMA – Phases – Characteristics – Applications – GAN – Rheological materials

Contact Periods:

Lecture: 45 Periods Tutorial: – Periods Practical: – Periods Total: 45 Periods

TEXT BOOKS:

1. Kasap. S.O., “Principles of Electronic Materials and Devices”, McGraw-Hill Education, New Delhi,2015
2. Kittel.C., “Introduction to Solid State Physics”, Wiley, New Delhi, 2015

REFERENCES:

1. Hanson. G.W, “Fundamentals of Nanoelectronics”, Pearson Education, New Delhi,2012
2. A.K. Bandyopathyay, “Nanomaterials”, New Age International Publishers, New Delhi, 2010
3. Pallab Bhattacharya, “Semiconductor Opto Electronic Devices”, PHI Learning Private Limited, New Delhi, 2017

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Outline the basic ideas of classical and quantum electron theories and energy band structures	Understand
CO2	Classify the semiconductors and its applications	Understand
CO3	Summarise the concept of the magnetic materials for data storage applications	Understand
CO4	Explain the properties of superconducting materials and its applications	Understand
CO5	Use the properties of quantum structures and smart materials to apply it in the field of engineering.	Understand

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	1	-	-
CO	3	2	1	-	-	-	-	-	-	-	-	1	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER I

U19CSG01	PROBLEM SOLVING USING PYTHON PROGRAMMING *(for BME, CHEMICAL, CSE, ECE, EEE, AD)*	Category: ES			
		L	T	P	C
		2	0	2	3

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To learn basics of computers and problem solving techniques.
- To understand syntax and semantics of python programming.
- To develop simple python programs.

UNIT I COMPUTER BASICS AND PROBLEM SOLVING STRATEGIES 6

Introduction to Computers: Characteristics, Classification, Applications, Components- Hardware and Software- Algorithms - Algorithmic building blocks - Notations: Pseudo code, Flow chart, Programming language - Programming Paradigms - Computational thinking.

UNIT II LANGUAGE BASICS 5

Python interpreter and interactive mode - Tokens - Data types –Numbers and math functions - Input and Output operations - Comments - Reserved words - Indentation - Operators and expressions - Precedence and associativity - Type conversion- Debugging - Common errors in Python – Classes and objects.

UNIT III CONTROL STATEMENTS, FUNCTIONS AND MODULES 6

Selection/Conditional branching statements: if, if-else, Nested-if, if-elif-else statements - Iterative statements: while, for loop - break, continue and pass statements - Functions: Function Definition and Function call, Variable scope and Lifetime, Return statement, Lambda functions or Anonymous functions, Recursion - Modules and Packages.

UNIT IV PYTHON DATA STRUCTURES 7

Strings: Slicing, Immutability, Built-in string methods and functions, Concatenating, Appending and Multiplying strings, String modules, Regular expressions - List: Creation, Accessing values, Slicing, List methods, In-built functions for Lists - Tuples: Creation, Operations on tuples, Traversing, Indexing and Slicing, Tuple assignment, In-built functions for tuples - Sets: Creation, Operations - Dictionaries: operations and methods.

UNIT V EXCEPTION AND FILE HANDLING 6

Exceptions: Errors and Exceptions, Handling exception, Built-in and User-defined exceptions - Files: Types, Operations: Open, Read, Write, Close.

LIST OF EXPERIMENTS

1. Algorithms, flowchart and pseudo code
2. Language basics
3. Input and output statements
4. Looping and decision making statements
5. String operations
6. Recursive functions
7. Python data structures
8. Searching and Sorting
9. Generating histogram
10. File and exception handling

Contact Periods:

Lecture: 30 Periods Tutorial: – Periods Practical: 30 Periods Total: 60 Periods

TEXT BOOKS:

1. Reema Thareja, "Python programming: Using problem solving approach", Oxford Press, 2017.

REFERENCES:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. (http://greenteapress.com/wp/think-python/)
3. Ashok Namdev Kamthane and Amit Ashok Kamthane, "Programming and Problem Solving with Python", McGrawHill Education, 2018.
4. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach". Pearson India Education Services Pvt. Ltd., 2016.
5. Roland Backhouse, "Algorithmic Problem Solving", John Wiley & Sons, 2011.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Interpret computer basics and algorithmic solutions for a given problem.	Understand
CO2	Demonstrate the usage of data types, operators and expressions in python programming.	Apply
CO3	Design python programs using functions, modules and packages.	Apply
CO4	Develop programs using python data structures.	Apply
CO5	Demonstrate the usage of exceptions and file handling.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	2	2	2	-	2	-	-
CO2	3	3	2	-	-	-	-	2	2	2	-	2	-	-
CO3	3	3	3	-	-	-	-	2	2	2	-	2	-	-
CO4	3	3	2	-	-	-	-	2	2	2	-	2	-	-
CO5	3	3	2	-	-	-	-	2	2	2	-	2	-	-
CO	3	3	2	-	-	-	-	2	2	2	-	2	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER I

U19CSG02	COMPUTATIONAL THINKING *(for BME, CSE, ECE, EEE, AD)*	Category: ES			
		L	T	P	C
		2	0	2	3

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To formulate problems in a way that enables the use of a computer to solve them.
- To identify, analyze and implement possible solutions with the goal of achieving the most efficient and effective combination of steps and resources.
- To generalize and transfer this problem solving process to wide variety of problems.

UNIT I PRINCIPLES OF COMPUTATIONAL THINKING 7

Programming – Algorithmic thinking – Bitwise and Boolean algebra – Compiler vs interpreter – Pseudo coding – Problem definition – Data collection – Problem decomposition – Abstraction – Flowcharting – Name binding – Selection – Repetition – Modularization – Sample exercise problems and deriving solutions.

UNIT II DATA ORGANIZATION & PROCESSING USING PYTHON 5

Operators, Variables and Data types – Loops and conditions – Nested loop – Strings – Euclid's algorithm – Arrays – Functions - Recursion.

UNIT III REVERSE ENGINEERING & SOLUTIONS 6

Algorithm Tracing Technique (simulating execution) – Best practices: keeping it simple, documentation, style, idioms, DRY code, naming conventions, and comments – Debugging - Anticipating output from pseudo code.

UNIT IV APPLIED COMPUTATIONAL THINKING 6

Operating systems basics – Networking basics – Database Management System (DBMS) – SQL – No SQL - JSON – API – XML.

UNIT V EFFICIENCY ANALYSIS AND BENCHMARKING 6

Algorithm efficiency – Time complexity in programs – Mathematical preliminaries – Asymptotic analysis - Recurrence relations – Algorithm design paradigms: Divide and conquer algorithms, Dynamic programming, and Greedy algorithms.

LIST OF EXPERIMENTS

1. Print the difference of indices of largest and smallest number in an array.
2. Length of the longest substring without repeating characters.
3. Prime factors of a given number.
4. Product of the sum of diagonals of an array.
5. The greatest common divisor (GCD) of two numbers – with & without Euclid's algorithm.
6. Finding output of sequencing and looping puzzles.
7. Finding output of pattern matching puzzles.
8. Using only indexing technique- storing and retrieving Array elements (without library functions).
9. Add, subtract, multiply, and check for equality in the two given matrices (without library functions).
10. Utilize the Pythagorean Theorem to calculate a third side of a right triangle, given the other two sides.
11. Time complexity analysis – Tower of Hanoi (using Recursion) – 3 rods and n disks.
12. Time complexity analysis – Tower of Hanoi (using Recursion) – 4 rods and n disks.

Contact Periods:

Lecture: 30 Periods Tutorial: – Periods Practical: 30 Periods Total: 60 Periods

REFERENCES:

1. David Riley and Kenny Hunt, "Computational thinking for modern solver", Chapman & Hall/CRC, 2014.
2. R.G. Dromey, "How to solve it by Computer", PHI, 2008.
3. Exploring Computational Thinking. https://edu.google.com/resources/programs/exploring-computational-thinking/.
4. GUVI Technical Learning Platform, Certifications, Assessments and FDP/FEM for KPRIET.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Decompose a given problem into modules	Apply
CO2	Create suitable algorithms to solve simple problems	Apply
CO3	Use best practices for documentation that ensure long term maintenance.	Apply
CO4	Explain the basics of operating system, networking, database management system, API and XML	Understand
CO5	Determine efficiency of algorithms	Analyz

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	2	2	2	-	2	-	-
CO2	2	1	-	-	-	-	-	2	2	2	-	2	-	-
CO3	2	1	-	-	-	-	-	2	2	2	-	2	-	-
CO4	2	-	-	-	-	-	-	2	2	2	-	2	-	-
CO5	3	-	3	-	-	-	-	2	3	2	-	3	-	-
CO	2	2	3	-	-	-	-	2	2	2	-	2	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER I

U19AD101	PRINCIPLES OF ELECTRONICS ENGINEERING	Category: ES			
		L	T	P	C
		3	0	0	3

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To study the basic concepts of integrated circuits
- To introduce the basics of digital electronics
- To understand about Memory and display devices

UNIT I BASIC ELECTRONIC COMPONENTS 9

Passive components – Resistors, Inductors, Capacitors-specifications, classifications, Diode-PN junction, Zener diode-construction, operation- forward bias, reverse bias, characteristics-BJT – NPN, PNP- Construction and Operation.

UNIT II APPLICATIONS OF DIODES AND TRANSISTORS 9

Half wave, full wave and bridge rectifiers-Voltage regulator, Zener diode shunt regulator- CE Amplifier, RC oscillator. Overview of Voltage stabilizers, Inverters.

UNIT III INTEGRATED CIRCUITS 9

Operational amplifier- ideal characteristics, inverting, non-inverting-applications of op-amp- adder, subtractor, integrator, differentiator, comparator

UNIT IV BASICS OF DIGITAL ELECTRONICS 9

Number systems, Boolean algebra, Logic gates, sequential and combinational circuits- adder, subtractor, Overview of flip-flop, latches, counters, shift registers

UNIT V MEMORY AND DISPLAY DEVICES 9

RAM-SRAM, DRAM, ROM-PROM, EPROM, EEPROM, LED, LCD, Plasma, 3D display.

Contact Periods:

Lecture: 45 Periods Tutorial: - Periods Practical: – Periods Total: 45 Periods

REFERENCES:

1. R. S. Sedha, “A Textbook of Applied Electronics”, S.Chand & Company Ltd, 2013
2. Roy Chaudary, “Linear Integrated Circuits”, Seventh Edition, New Age International Publishers, 2018
3. M. Morris Mano, “Digital Design”, Pearson, 2018
4. Sol Sherr, “Electronic displays”, Second Edition, Wiley, 1993.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Illustrate principles of electronic components	Understand
CO2	Infer applications of diodes and transistors	Understand
CO3	Explain about op-amp and its applications	Understand
CO4	Understand the operation of digital circuits	Understand
CO5	Classify the types of memory and display devices	Understand

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO3	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO4	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO5	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO	2	1	-	-	-	-	-	-	-	-	-	2	-	-
Correlation levels:	1: Slight (Low)		2: Moderate (Medium)				3: Substantial (High)							

SEMESTER I

U19CA001	NUMERICAL APTITUDE AND VERBAL ABILITY - I *(Common to all Branches)*	Category: EEC			
		L	T	P	C
		1	0	0	1

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- Understand the concepts of Coding, Decoding, Interpreting and applying.
- Comprehend the basic concepts of logical reasoning and verbal reasoning.

UNIT I **3**

Clocks & Calendars, Alpha Numeric Series, Coding & Decoding, Blood Relations, Odd man out, Direction.

UNIT II **3**

Syllogism, Order and Ranking, Puzzles, Cubes and Dices, Statements, Assumptions and Conclusions, Seating Arrangements, Data Sufficiency, Data Interpretation

UNIT III **3**

Parts of Speech (Nouns, Pronouns, Verbs, Adjectives, Adverbs, Preposition, Conjunction, Interjection) Gerunds, Phrases and Clauses

UNIT IV **3**

Tenses, Active and Passive Voice (tense usage), Verbal Ability (Vocabulary and Reasoning)

UNIT V **3**

Closet Test, Sentence Formation, Para Jumbles, Passage Formation, Spotting Errors, Verbal analogies.

Contact Periods:

Lecture: 15 Periods Tutorial: - Periods Practical: – Periods Total: 15 Periods

TEXT BOOKS:

1. R S Aggarwal – Quantitative Aptitude for Competitive Examinations, 17th Edition
2. S. Chand Publishing, New Delhi, 2017
3. Arun Sharma – How to prepare for Quantitative Aptitude for CAT, 8th Edition McGraw Hill Education, Chennai, 2018.
4. R S Aggarwal – Objective General English, S Chand Publishing, New Delhi, 2017

REFERENCES:

1. R.S. Aggarwal – A Modern Approach to Verbal & Non-Verbal Reasoning, SChand Publishing, New Delhi, 2017
2. Abhijit Guha - Quantitative Aptitude for Competitive Examination, McGraw Hill Education (India) Private Limited, 5th Edition, 2015.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Use basics of counting through Permutation and Combination for arrangement of tasks	Apply
CO2	Draft letters, emails and make notes with appropriate use of words.	Understand

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO	3	-	-	-	-	-	-	-	-	3	-	-	-	-
Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)														

SEMESTER I

U19CS102	WORKSHOP *(for CSE, AD)*	Category: ES			
		L	T	P	C
		0	0	4	2

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To impart fundamental hands-on skill in carrying out experiments at higher semester practical courses

MECHANICAL ENGINEERING **6**

Study on welding, fitting and carpentry

CIVIL ENGINEERING **6**

1. Study of pipeline joints, its location and function, valves, taps, coupling, union, reducers, elbows, in house hold fitting (Display and Explanation).
2. Exercise:

   Demonstration of

   a. Basic pipeline connection.

   b. Pipe connection with different joining components.

   c. Mixed pipe connections with joints.

ELECTRICAL ENGINEERING **6**

1. House wiring (Display and Demonstration).
2. Earthing practices and its significances (Demonstration).
3. Measurements and energy using energy meter (Demonstration).
4. Functionalities of RPS/AFO/CRO (Demonstration / Application).

ELECTRONICS AND COMMUNICATION ENGINEERING **6**

1. Identifying electronic components and understanding PCB glossary. (Display and Explanation)
2. Conversion of schematic into PCB layout and PCB fabrication. (Display and Explanation)
3. Practicing of soldering and Desoldering. (Display and Explanation)

COMPUTER SCIENCE AND ENGINEERING **36**

PC assembling configuration and troubleshooting

1. Assembling a SMPS in a cabinet, fixing a processor in a mother board
2. Assembling RAM in a motherboard, pinning a cooling fan in a mother board
3. Assembling a hard disc drive in a cabinet, assembling a CD/DVD ROM in a cabinet. Fixing motherboard in a cabinet
4. Connecting the cables from the SMPS to motherboard, hard disc, drives & etc, establishing data connection to motherboard, hard disc, drives. Fixing wires for power restart switches, fixing wires for power & HDD LED‘s, fixing wires for external USB and Audio connections.
5. Hardware troubleshooting
6. Operating system and software installation
7. Configuration of internet

Contact Periods:

Lecture: - Periods Tutorial: - Periods Practical: 60 Periods Total: 60 Periods

TEXT BOOKS:

1. B.Govindarajulu, “IBM PC and Clones hardware troubleshooting and maintenance”, New Delhi, 2002, Tata McGraw-Hill, ISBN-13: 978-0070482869.

REFERENCES:

1. Gary B.Shelly, Misty E.Vermat ,”Discovering Computers”, Cengage Learning, 2012.
2. Craig Zacker& John Rourke, “The Complete Reference:PC hardware”, New Delhi, Tata McGraw-Hill, 2001, ISBN-13: 978-0072125160.
3. Mike Meyers, “Introduction to PC Hardware and Troubleshooting”, New Delhi, Tata McGraw-Hill, 2003, ISBN-13: 978-0072226324.
4. Peter Abel, Niyaz Nizamuddin, “IBM PC Assembly Language and Programming”, Pearson Education, 2007.
5. Web resources:
    i. https://www.netacad.com/
    ii. https://www.youtube.com/watch?v=EJJHYfVzo-4
    iii. https://www.youtube.com/watch?v=ctAVC2JwEwI&t=163s
    iv. https://www.youtube.com/watch?v=Q1fpHW-xOpU
    v. https://www.youtube.com/watch?v=pddYuixPBJ0
    vi. https://www.youtube.com/watch?v=J10hMcfeATM
    vii. https://turbofuture.com/computers/the-motherboard-components

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Assemble/ setup and upgrade personal computer systems	Apply
CO2	Troubleshoot system, software, and hardware problems; configure legacy devices; develop and maintain compatibility with other network operating system platforms; boot a computer when windows OS is not functioning	Apply
CO3	Prepare configuration management of windows operating system	Apply
CO4	Discuss networking gateways and crimping methods	Understand
CO5	Configure and troubleshoot network problems	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	-	-	-	-	-	-	1	-	-
CO2	3	2	3	-	1	-	-	-	-	-	-	1	-	-
CO3	3	2	3	-	1	-	-	-	-	-	-	1	-	-
CO4	3	2	1	-	1	-	-	-	-	-	-	1	-	-
CO5	2	1	1	-	1	-	-	-	-	-	-	1	-	-
CO	3	2	2	-	1	-	-	-	-	-	-	1	-	-
Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)														

SEMESTER I

U19AD102	ELECTRONICS ENGINEERING LABORATORY	Category: ES			
		L	T	P	C
		0	0	2	1

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To demonstrate the applications of diodes and transistors.
- To interpret the characteristics of operational amplifiers.
- To design and construct the combinational and sequential logic circuits for different applications.

LIST OF EXPERIMENTS

1. Characteristics of PN Junction diode.
2. Characteristics of Zener junction diode.
3. Halfwave and Full wave rectifier circuits using PN junction diode.
4. Voltage regulator circuit using Zener diode.
5. Common Emitter input-output characteristics of Bipolar Junction Transistor.
6. Characteristics of Common Emitter BJT Amplifier in NPN configuration.
7. Design and implementation of RC Phase-shift oscillator.
8. Execution of Inverting and Non-inverting modes of operational amplifier.
9. Design of Integrator and differentiator using operational amplifier.
10. Implementation of adder and subtractor using logic gates.

Contact Periods:

Lecture: – Periods Tutorial: – Periods Practical: 15 Periods Total: 15 Periods

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Analyze the characteristics and applications of PN junction diode and Zener diode.	Apply
CO2	Implement electronic circuits using Bipolar Junction Transistor.	Apply
CO3	Design sinusoidal oscillators for different frequencies.	Apply
CO4	Construct wave-shaping circuits using operational amplifier.	Apply
CO5	Design combinational circuits using logic gates.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	2	2	-	-	-	-
CO2	3	2	2	-	-	-	-	-	2	2	-	-	-	-
CO3	3	2	2	-	-	-	-	-	2	2	-	-	-	-
CO4	3	2	2	-	-	-	-	-	2	2	-	-	-	-
CO5	3	2	2	-	-	-	-	-	2	2	-	-	-	-
CO	3	2	2	-	-	-	-	-	2	2	-	-	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER II

U19LE201	ADVANCED COMMUNICATIVE ENGLISH	Category: HS			
		L	T	P	C
		1	0	2	2

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- Foster their ability to develop communicative strategies and skills.
- Strengthen the learners to evocate their listening skills and enhance writing ability.
- Exhibit proactive reading strategies and speaking techniques.

UNIT I LANGUAGE ADEPTNERS **9**

Cloze test – Sentence completion – Relative clause – Transformation of sentences – Common errors – Discourse markers – Formal and Informal expressions – Framing questions – Figures of speech

UNIT II LISTENING **9**

Listening to announcements – Interviews – Group discussions– Dialogues – News items – Documentaries – IELTS – GRE – TOEFL based listening

UNIT III SPEAKING **9**

Real life situations through role play – Language use – Pronunciation, Stress and Intonation – Narrating events – Presentation – Group discussion

UNIT IV READING **9**

Reading strategies – Reading comprehension – Reading short stories – Journal articles – Inferring editorial column – Cloze reading

UNIT V WRITING **9**

Book review – Guided writing – Writing gadget review – Free writing – Rephrasing – Interpreting text – Email writing – Process description

LIST OF EXPERIMENTS

11. Listening for announcements
12. Listening to dialogues
13. Listening to documentaries
14. Listening to interviews
15. IELTS based listening
16. Role play
17. Product description
18. Group discussion
19. Book review
20. General presentation

Contact Periods:

Lecture: 15 Periods Tutorial: – Periods Practical: 30 Periods Total: 45 Periods

TEXT BOOKS:

3. K N Shoba, Lourdes JoavaniRayen. “Communicative English”. Cambridge University Press, 2017
4. Sudharshana N P and Savitha C, “English for Technical Communication”, Cambridge University Press, 2016

REFERENCES:

4. Murphy, Raymond, “Intermediate English Grammar”, Cambridge University Press, 2009
5. Means, Thomas L, “English and Communication for Colleges”, Cengage 2017
6. “Using English: A Course book for Undergraduate Engineers and Technologists” Orient BlackSwan, 2017

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Inculcate effective reading strategy	Understand
CO2	Express opinions in real life situations	Understand
CO3	Construct academic and professional writing	Apply
CO4	Impart the listening ability in self-learning	Apply
CO5	Adept to the needs of the second language learner in a grammatical context	Understand

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	2	-	2	-	3	-	1	-	-
CO3	-	-	-	-	-	2	-	-	2	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	1	-	-
CO5	-	-	-	-	-	-	2	2	-	3	-	1	-	-
CO	-	-	-	-	-	2	2	2	2	3	-	1	-	-
Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)														

SEMESTER II

U19MA205	APPLIED STATISTICAL ANALYSIS	Category: BS			
		L	T	P	C
		2	0	2	3

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To understand the concepts of Statistics in the field of engineering and technology
- To apply the concepts of testing of hypothesis for small and large samples.
- To apply design of experiments in the field of engineering and technology.

UNIT I DESCRIPTIVE STATISTICS 6

Frequency distribution – Bar graphs and Pie charts – Histogram- Ogive – Simpson's paradox – Measures of central tenancy - Measures of Variability.

UNIT II SAMPLING 6

Sampling distribution - Estimation: Point estimation, interval estimation - Criteria of a good estimator –Interval estimation of mean (single sample and two samples) - Maximum likelihood estimator.

UNIT III TESTING OF HYPOTHESIS 6

Large sample test for single mean - Small sample test: t, F distributions - Tests for Goodness of fit.

UNIT IV CORRELATION AND REGRESSION 6

Estimation using the regression line - Correlation analysis -Limitations, errors, and caveats of using regression and correlation analyses.

UNIT V DESIGN OF EXPERIMENTS 6

Analysis of variance - Completely Randomized Design , Randomized Block Design

LIST OF EXPERIMENTS

1. Data Examination
2. Student's t- Test
3. Correlation
4. Regression
5. ANOVA

Contact Periods:

Lecture: 30 Periods Tutorial: - Periods Practical: 15 Periods Total: 45 Periods

TEXT BOOKS:

1. Ronald E. Walpole, Raymond H. Meyers and Sharon L. Meyers, "Probability and Statistics for Engineers and Scientists", Pearson Education, 2014.
2. Jay L. Devore, "Probability and Statistics for Engineering and Sciences", Cengage Learning, 2015.

REFERENCES:

1. Sheldon M.Ross, “Introduction to Probability Models”, Academic Press, 2014.
2. Douglas C Montgomery and George C Runges, “Applied Statistics and Probability for Engineers”, John Wiley &Sons, 2014.
3. Trivedi K.S., “Probability and Statistics with Reliability, Queuing and Computer Science Applications”, Prentice Hall, 2011.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Apply the technology to create graphical representation of the data	Apply
CO2	Analyse data from multi-stage surveys	Apply
CO3	Analyse small and large samples in industry by using testing of hypothesis	Apply
CO4	Interpret the correlation between two variables.	Apply
CO5	Compute and interpret the results of real time applications by performing ANOVA and F test.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO	3	2	-	-	-	-	-	-	-	-	-	1	-	-
Correlation levels:	1: Slight (Low)		2: Moderate (Medium)				3: Substantial (High)							

SEMESTER II

U19MA206	LINEAR ALGEBRA AND VECTOR SPACES	Category: BS			
		L	T	P	C
		3	0	0	3

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To acquire knowledge of decomposition of matrices.
- To understand postulates of vector spaces and linear transformations.
- To understand concepts of eigenvalues and eigenvectors of a matrix and inner product spaces

UNIT I LINEAR SYSTEMS **9**

Geometric interpretation of linear system in 2 and 3 unknowns - Row reduction and Echelon forms – Vector equation – Matrix equation Ax=b-LU decomposition- Applications of linear systems.

UNIT II VECTOR SPACES **9**

Vector spaces and subspaces – Linear combination, Span, Linear independence and dependence - Null space, Column space, and Row space – Basis and dimension of a vector space – Rank and nullity-Applications to Electrical network

UNIT III LINEAR TRANSFORMATION **9**

General Linear Transformations – Kernel and range – Matrices of general linear transformation-Geometry linear operators-Change of basis.

UNIT IV INNER PRODUCT SPACES **9**

Inner product, Length, angle and orthogonality – Orthogonal sets – Orthogonal projections – Inner product spaces – Orthonormal basis: Gram-Schmidt process.

UNIT V EIGENVALUES AND EIGENVECTORS **9**

Eigenvalues and Eigenvectors– Singular Value Decomposition – Eigenvalues and linear transformations - Discrete Dynamical systems.

Contact Periods:

Lecture: 45 Periods Tutorial: - Periods Practical: - Periods Total: 45 Periods

TEXT BOOKS:

1. Howard Anton and Chris Rorres, “Elementary Linear Algebra”, Wiley, 2011.
2. David C. Lay, “Linear Algebra and its Applications", Pearson Education, 2011.

REFERENCES:

1. Gilbert Strang, “Linear Algebra and its Applications”, Thomson Learning, 2009.
2. Steven J. Leon, “Linear Algebra with Applications”, Prentice Hall, 2006.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Solve and interpret the linear system of equations.	Apply
CO2	Identify linear independence and dependence of vectors and basis of vector space.	Apply
CO3	Apply linear transformations engineering fields.	Apply
CO4	Compute orthonormal basis using standard methods.	Apply
CO5	Compute the singular value decomposition of a matrix.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	1	-	-
CO	3	2	-	-	-	-	-	-	-	-	-	1	-	-
Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)														

SEMESTER II

U19AD201	FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE	Category: ES			
		L	T	P	C
		3	0	0	3

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To introduce the fundamentals of artificial intelligence and intelligent agents
- To learn the methods of knowledge representation and knowledge inference
- To understand the concepts of expert systems

UNIT I INTRODUCTION 9

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent agents – Typical Intelligent Agents – Introduction to AI-problem formulation, Problem definition.

UNIT II PRODUCTION SYSTEMS AND PROBLEM SOLVING METHODS 9

Production systems, Production system characteristics - Specialized production system- Problem solving methods - Problem graphs, matching, indexing and heuristic functions – Hill climbing - Depth first and breath first, constraints satisfaction problem.

UNIT III KNOWLEDGE REPRESENTATION AND INFERENCE 9

Knowledge representation: Predicate logic- Predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic - Knowledge Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory.

UNIT IV DATA ANALYSIS AND FEATURE ENGINEERING 9

Data description – Feature types – Categorical & continuous variables – Data correlation – Feature selection – Handling missing data – Scaling & Normalization

UNIT V EXPERT SYSTEMS AND LINEAR MODELS 9

Expert systems - Architecture of expert systems, Roles of expert systems - Knowledge acquisition – Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells– Linear Regression – Decision Tree – Logistic Regression

Contact Periods:

Lecture: 45 Periods Tutorial: - Periods Practical: – Periods Total: 45 Periods

TEXT BOOKS:

1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill- 2008. (Units-I,II,IV)
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III &V).

REFERENCES:

1. Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007.
3. Deepak Khemani “Artificial Intelligence”, Tata Mc Graw Hill Education 2013.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Exemplify the fundamentals of Artificial Intelligence and Intelligent agents.	Understand
CO2	Identify appropriate methods to solve AI problems.	Apply
CO3	Use different methodologies to represent and infer knowledge.	Apply
CO4	Apply pre-processing techniques on data.	Analyze
CO5	Discuss the concepts of Expert Systems and its models.	Understand

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	2	2	2	-	3	-	-
CO2	3	3	2	-	2	-	-	2	2	2	-	3	-	-
CO3	3	3	2	-	2	-	-	2	2	2	-	3	-	-
CO4	3	3	2	-	2	-	-	2	2	2	-	3	-	-
CO5	3	3	2	-	2	-	-	2	2	2	-	3	-	-
CO	3	3	2	-	2	-	-	2	2	2	-	3	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER II

U19AD202	INTRODUCTION TO BIOLOGY FOR ENGINEERS	Category: ES			
		L	T	P	C
		2	0	0	2

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To understand the fundamentals of cell biology and cellular processes
- To learn the about intelligence of the cell
- To infer the basic concepts of bio-informatics using computational methods

UNIT I BASICS OF CELLS 6

Classification of biological macro molecules, Cellular Structures, Cellular Energy Production and Utilization- The Cell Cycle and Cell Division, Meiosis and Formation of Gametes.

UNIT II GENES 6

Protein Synthesis, Gene Expression and Mutation, Evolution Patterns and Processes.

UNIT III DNA COMPUTATION 6

DNA replication – genome - hidden messages in the genome - Python Programming and packages for Bio-informatics.

UNIT IV APPLIED DNA SEQUENCING 6

Finding Replication Origins – DNA A boxes - Counting words - The Frequent Words Problem - Frequent words in Vibrio cholera.

UNIT V ALGORITHMS FOR BIOLOGY 6

Hunting for Regulatory Motifs - Motif Search - Gibbs Sampling. Assembling Genomes using Graph algorithms.

Contact Periods:

Lecture: 30 Periods Tutorial: – Periods Practical: – Periods Total: 30 Periods

TEXT BOOKS:

4. Ryan Rogers, Cell and Molecular Biology for Environmental Engineers, Momentum Press Engineering, 2018.
5. Gabi Nindl Waite, Lee R. Waite, Applied Cell and Molecular Biology for Engineers, McGraw Hill Publishers, 2007.
6. Philip Compeau and Pavel Pevzener, Finding Hidden Messages in DNA, Active Learning Publishers, 2015.

REFERENCES:

1. ‘Bioinformatics algorithm, An active learning Approach’, Phillip Compeauand Pavel Pevzner Vol. 1. and Vol. 2, 2015.
2. ‘Essential Bioinformatics’, JinXiong, Cambridge University Press, 2006.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Discuss the basic concepts in cell biology.	Understand
CO2	Illustrate the basics of cellular process.	Understand
CO3	Use python programming for bio-informatics.	Understand
CO4	Deliberate the computational algorithms of DNA encoding.	Understand
CO5	Enumerate the assembling genomes using computational methods	Understand

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	2	2	2	-	1	-	-
CO2	3	2	1	-	-	-	-	2	2	2	-	1	-	-
CO3	3	2	1	-	-	-	-	2	2	2	-	1	-	-
CO4	3	2	1	-	-	-	-	2	2	2	-	1	-	-
CO5	3	2	1	-	-	-	-	2	2	2	-	1	-	-
CO	3	2	1	-	-	-	-	2	2	2	-	1	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER II

U19AD203	DATA STRUCTURES	Category: PC			
		L	T	P	C
		3	0	0	3

PRE–REQUISITES:

- Computational thinking, Programming basics

COURSE OBJECTIVES:

- To write simple programs using C programming constructs
- To apply concepts of arrays, pointers, functions and structures in programming
- To construct List, Stack, Queue Abstract Data Types (ADTs) and Trees

UNIT I PROGRAMMING FUNDAMENTALS IN C LANGUAGE 9

Structure of C program - Data Types - Storage classes - Constants – Enumeration Constants - Keywords – Operators- Control structures - Pre-processor directives – Arrays: One dimensional array - Two dimensional arrays – Multi dimensional arrays - Strings: operations on strings.

UNIT II POINTERS, FUNCTIONS AND STRUCTURES 9

Pointers: Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers- Introduction to functions: Function prototype - function definition - function call – Call by value – Call by reference - function types -Built-in functions - Recursive functions - Structure - Nested structures – Self-referential structures.

UNIT III LINEAR DATA STRUCTURES 9

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation - singly linked lists - doubly-linked lists - circularly linked lists - Stack ADT – Operations – Applications – Queue ADT – Operations – Circular Queue – Priority Queue – deQueue –Sorting – Searching.

UNIT IV NON-LINEAR DATA STRUCTURES 9

Trees – Binary Trees – Complete binary tree – Full binary tree – Skewed binary tree - Binary tree representation and binary tree traversals – Binary Search Trees -Operations in binary search tree – AVL Trees – Rotations- Graphs – graph traversals.

UNIT V ALGORITHM ANALYSIS 9

Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Mathematical Analysis of Non-recursive and recursive Algorithms – Algorithm Design Technique – Brute Force –selection sort, bubble sort – Divide and Conquer - merge sort and quick sort.

Contact Periods:

Lecture: 45 Periods Tutorial: - Periods Practical: – Periods Total: 45 Periods

TEXT BOOKS:

1. 1. Reema Thareja, “Programming in C”, First Edition, Oxford University Press, 2018. (UNIT- I, II).
2. Reema Thareja, “Data structures using C”, Oxford University Press, 2014. (UNIT – III &IV)
3. Anany Levitin, ”Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012 (UNIT V)

REFERENCES:

1. Pradip Dey, Manas Gosh, “Programming in C”, First Edition, Oxford University Press, 2018.
2. Herbert Schildt, “C: The Complete Reference” McGraw Hill Education; 4/e, 2017.
3. R. Venkatesan, S. Lovelyn Rose, “Data Structures”, Wiley, 2/e, 2019.
4. Seymour Lipschutz, “Data structures with C” McGraw Hill Education; 4/e, 2017.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Implement the programming fundamentals in C language with using arrays.	Apply
CO2	Apply the concepts of pointers, functions and structures in programming.	Apply
CO3	Implement the concept of linear data structures like list, stack and queue.	Apply
CO4	Articulate the concepts of the non-linear data structures trees and graphs	Understand
CO5	Determine the complexity of algorithms	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	-	-	-	-	2	2	2	-	2	-	-
CO2	3	3	3	-	-	-	-	2	2	2	-	2	-	-
CO3	3	3	3	-	-	-	-	2	2	2	-	2	-	-
CO4	3	3	2	-	-	-	-	2	2	2	-	2	-	-
CO5	3	3	3	-	-	-	-	2	2	2	-	2	-	-
CO	3	3	2	-	-	-	-	2	2	2	-	2	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER II

U19CA002	NUMERICAL APTITUDE AND VERBAL ABILITY -II	Category: EEC			
		L	T	P	C
		1	0	0	1

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- Understand the concepts of Number System, Profit and Loss and Infer Time, Speed and Distance.
- Write sentences with appropriate grammatical structure in a professional context.

UNIT I **3**

Divisibility tests (Divisibility Factor, Prime Factor, Divisibility Rules, Finding UNIT Digit), LCM&HCF (Listing Multiples, Prime Factorization, Division method, etc.), NUMBER SYSTEM (Numbers, Prime, Composite, Co-Prime numbers), PERCENTAGE (Percentage, Fractions of Percentages, Expenditure, Price, Consumption, Population, Depreciation)

UNIT II **3**

PROFIT, LOSS & DISCOUNTS – (CP, SP, MP, Profit, Loss, Discount), RATIO & PROPORTION (Compounded Ratio, Mean Proportional, Componendo, Dividendo, Directly Proportional, Inversely Proportional), Age Problems (Various techniques to solve age problems)

UNIT III **3**

Averages (Simple average, weighted average) Mixtures and Alligations (Various techniques to solve mixtures and alligations), Time, Speed and Distance, Train Problems (Problems in same and opposite Direction), Boats and Streams (Downstream, Upstream, Average Speed)

UNIT IV **3**

Time & Work (Problems on Time, Work and Efficiency), Permutation & Combination (arrangements & selections, together and not together problems), Probability (Coins, card, Dice) Logarithms (Log Function, Common Log, Natural Log, Binary Log, Laws of Logarithms), Areas and Volumes

UNIT V **3**

Reading Comprehension, Letter Writing, Email Writing, Essay Writing, Resume Building

Contact Periods:

Lecture: 15 Periods Tutorial: - Periods Practical: – Periods Total: 15 Periods

TEXT BOOKS:

1. R S Aggarwal – Quantitative Aptitude for Competitive Examinations, 17th Edition S. Chand Publishing, New Delhi, 2017
2. Arun Sharma – How to prepare for Quantitative Aptitude for CAT, 8th Edition McGraw Hill Education, Chennai, 2018.
3. R S Aggarwal – Objective General English, S Chand Publishing, New Delhi, 2017

REFERENCES:

1. R.S. Aggarwal – A Modern Approach to Verbal & Non-Verbal Reasoning,S Chand Publishing, New Delhi, 2017
2. Abhijit Guha - Quantitative Aptitude for Competitive Examination, McGraw Hill Education (India) Private Limited, 5th Edition, 2015.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Use basics of counting through Permutation and Combination for arrangement of tasks	Apply
CO2	Draft letters, emails and make notes with appropriate use of words	Understand

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)														

SEMESTER II

U19AD204	ARTIFICIAL INTELLIGENCE LABORATORY	Category: ES			
		L	T	P	C
		0	0	2	1

PRE–REQUISITES:

- Problem Solving using Python Programming

COURSE OBJECTIVES:

- To learn the basic programming constructs essential for building AI systems.
- To write programs for handling data.
- To write simple programs to implement knowledge inference system using python

LIST OF EXPERIMENTS

1. Basics of Numpy for Feature representation
   - Mathematical Operators, Numpy Arrays
   - Reshaping, Indexing and Manipulation of Numpy Arrays
   - Broadcasting, Random Number Generation (Uniform Distribution & Normal Distribution)
2. Pandas, Tabular Data Handler
   - Pandas Data frame, Column Indexing
   - File I/O using Pandas, Pandas & Numpy Integration, Distribution Analysis
3. Exploratory Data Analysis (Basic)
   - Identify the features and target variable. Interpret basic Data Description about data set (Categorical Data)
   - Identify the missing values in the given dataset and handle the missing values using Data Imputation Methods (Average, Max, Min)
   - Choose the features for training from the given dataset and split the dataset into train and testing data.
4. Data Processing (Normalization, Scaling, Categorical Feature Encoding)
5. Implement Linear Regression to build an intelligent predictive analytics model.
6. Implement Decision Tree to build an intelligent predictive analytics model.
7. Performance analysis on models using Test Dataset. (Accuracy, MAE, MSE)
8. AI Project (possibly from Kaggle, DevMesh)
   a) Sample :Cardiac Arrest Diagnosis using Logistic Regression

      The symptoms are running nose, cough and body temperature is 99.89 degree. Based on these symptoms diagnose the relevant illness. Should be done using Dataset from Kaggle and Publish a notebook with data description and model description

   b) Sample: Flowers classification using ML

      Classify the flowers into among the three species – virginica, setosa, or versicolor based on length and width of petals and sepals.

Contact Periods:

Lecture: – Periods Tutorial: – Periods Practical: 30 Periods Total: 30 Periods

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Implement data handling concepts using numpy and pandas package	Apply
CO2	Implement data pre-processing techniques	Apply
CO3	Write programs to infer knowledge from datasets	Apply
CO4	Implement and measure performance of basic intelligent models	Apply
CO5	Develop simple projects on artificial intelligence	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	2	2	2	-	3	-	-
CO2	3	3	2	-	-	-	-	2	2	2	-	3	-	-
CO3	3	3	2	-	-	-	-	2	2	2	-	3	-	-
CO4	3	3	2	-	-	-	-	2	2	2	-	3	-	-
CO5	3	3	2	-	-	-	-	2	2	2	-	3	-	-
CO	3	3	2	-	-	-	-	2	2	2	-	3	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER II

U19AD205	DATA STRUCTURES LABORATORY	Category: PC			
		L	T	P	C
		0	0	2	1

PRE–REQUISITES:

- Computational thinking, C Programming basics

COURSE OBJECTIVES:

- To write simple programs using C programming constructs with arrays and pointers
- To develop applications in C using functions and structures
- To implement linear data structures List, Stack and Queue ADTs (Abstract Data Types) using C

LIST OF EXPERIMENTS

11. Write a C program to get various shape information (Circle, Square, Rectangle, etc.,) and print the area and circumference.
12. Design a simple mathematical calculator using C.
13. Create a C application to get employee information for a reputed school and print the pay-slip of employees. Consider various possible roles in the school and perform the pay-slip generation.
14. Design and develop a health application that computes the Body Mass Index (BMI) of the individuals given with height and weight of persons and suggest the diet plan.
15. Design and develop a number converter that performs the decimal number into binary, octal and hexadecimal numbers using user defined functions and vice-versa.
16. Create a word processor which could perform the following on a paragraph:
    - Find the total number of words.
    - Capitalize the first word of each sentence.
    - Replace a given word with another word.
17. Insert, update, delete and append telephone details of an individual or a company into a telephone directory using structures and pointers.
18. Creation of Array and linked list implementation of Stack and Queue ADTs
19. Choose an appropriate data structures and create a token system for banking service (withdrawal, deposit and money transfer).
20. Create a food delivering system which allocates the path for delivery of food using appropriate data structures.
21. Create a book rack allocation system in a library, which allocates appropriate space for the books based on category using appropriate data structures.

Contact Periods:

Lecture: – Periods Tutorial: – Periods Practical: 30 Periods Total: 30 Periods

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Apply the programming fundamentals in C language for simple mathematical problems.	Apply
CO2	Apply arrays and pointers in C programs.	Apply
CO3	Apply the concept of functions and structures in C for problem solving	Apply
CO4	Implement linear data structures like List ADTs, Stack and Queue using C.	Apply
CO5	Implement the non-linear data structures trees and graph using C	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	-	-	-	-	2	2	2	-	2	-	-
CO2	3	3	2	-	-	-	-	2	2	2	-	2	-	-
CO3	3	3	3	-	-	-	-	2	2	2	-	2	-	-
CO4	3	3	2	-	-	-	-	2	2	2	-	2	-	-
CO5	3	3	2	-	-	-	-	2	2	2	-	2	-	-
CO	3	3	2	-	-	-	-	2	2	2	-	2	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER III

U19AD301	ETHICS AND HOLISTIC LIFE	Category: HS			
		L	T	P	C
		3	0	0	3

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To emphasize the meaning and nature of human values, ethics and holistic life for leading a good, successful and happy life through continuous examination of thoughts and conduct in day to day life.
- To understand the status and responsible role of individual in order to develop a civilized and human society.
- To view the place of Ethics and Human Values in the development of individual and society through identification and cross examination of life values and world view of his/her role models in society.

UNIT I HUMAN LIFE, ITS AIM AND SIGNIFICANCE 9

Importance of human values, The concept of a successful life, Happy life and a meaningful life, Ethical and decision making capability and its development: Meaning of Ethical dilemma, Stress management, Sharing real life experiences.

UNIT II CREATIVE AND LEADERSHIP ABILITY AND THEIR DEVELOPMENT 9

Intellectual, Emotional, Creative, Ethical - spiritual development, Aesthetic sense, Self-dependency, Activeness, Development of positive attitude, Planning and prioritizing, Time management.

UNIT III HARMONY IN PERSONAL AND SOCIAL 9

Concept of personal and group Ethics; Balance between - rights and duties-welfare of self and welfare of all, Interpersonal Skills, Creating a value based work culture in hostel, classroom and other places in the campus and society.

UNIT IV CHARACTER, RIGHTEOUSNESS AND VIRTUES FOR A MEANINGFUL LIFE 9

Attitude, Egolessness, Humility, Righteousness, Purity, Sharing, Truthfulness, Integrity, Self-restraint, Self-control, Sense of responsibility, Empathy, Love, Compassion, Maitri / Comradeship, Cooperation, Tolerance.

UNIT V DILEMMA BETWEEN MATERIALISTIC DEVELOPMENT AND HUMAN WELFARE 9

Science, Technology, Consumerism, Relation with Nature and Environment, New Dimension of Global Harmony: Democracy, Equality, Social Justice.

Contact Periods:

Lecture: 45 Periods Tutorial: – Periods Practical: – Periods Total: 45 Periods

TEXT BOOKS:

3. A. N. Tripati, “Human Values”, New Age International, 2009.
4. S. K. Chakraborty, Debangshu Chakraborty, “Human Values and Ethics, In search of Organisational Integrity”, Himalaya Publishing House, 2013.
5. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
6. World Community Service Centre, ‘Value Education’, Vethathiri publications, Erode, 2011.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Explain the meaning of human values, importance of ethics at individual, local, global level for leading a successful, happy holistic life	Remember
CO2	Realize his/her individual responsibility and develop their ability to create a civilized and human society	Understand
CO3	Identify the personal, professional and social values and integrate them in their personality after cross examination	Understand
CO4	Develop positive habits of thought and conduct to work cohesively with fellow beings who have variety of strengths, experiences, shortcomings and challenges, hence to enable them to handle diverse type of personalities	Apply
CO5	Explain the process of ethical decision making through critical assessment of incidents/cases of ethical dilemmas in personal, professional and social life	Remember

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	2	2	2	-	-	3	-	-
CO2	-	-	-	-	-	3	3	3	3	-	-	3	-	-
CO3	-	-	-	-	-	3	3	3	3	-	-	3	-	-
CO4	-	-	-	-	-	3	3	3	3	-	-	3	-	-
CO5	-	-	-	-	-	2	2	2	2	-	-	3	-	-
CO	-	-	-	-	-	3	3	3	3	-	-	3	-	-
Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)														

SEMESTER III

U19MA306	PROBABILITY AND RANDOM PROCESSES	Category: BS			
		L	T	P	C
		3	1	0	4

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- Understand the mathematical concepts of probability, one and two dimensional random variables and distributions.
- Understand the concepts of random processes which are widely used in IT fields.
- Apply the concept of spectral density in communication systems, networks, signal processing systems, and control systems.

UNIT I PROBABILITY 9 +3

Probability – Axioms of probability – Conditional probability – Total probability – Baye's theorem – Discrete and continuous random variables – Moments – Moment generating functions.

UNIT II DISTRIBUTION FUNCTIONS 9+3

Binomial, Poisson, Exponential, Uniform and Normal distributions– Applications.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression.

UNIT IV RANDOM PROCESSES 9+3

Classification – Stationary Process – Markov Process – Poisson Process – Discrete parameter Markov Chain.

UNIT V CORRELATION AND SPECTRAL DENSITIES 9+3

Auto Correlation Functions – Cross Correlation Functions – Properties – Power Spectral Density – Cross Spectral Density – Properties.

Contact Periods:

Lecture: 45 Periods Tutorial: 15 Periods Practical: – Periods Total: 60 Periods

TEXT BOOKS:

3. Oliver C. Ibe, Fundamentals of Applied probability and Random processes, 2nd Edition, Elsevier, 2014.
4. D. Gross and C.M. Harris, Fundamentals of Queuing Theory, Wiley Students 4th Edition, 2012.

REFERENCES:

9. A.O.Allen, Probability, Statistics and Queuing Theory with computer applications, Elsevier, 2nd edition, 2005.
10. H.A.Taha, Operations Research, Pearson Education, Asia, 9th edition,2014.
11. K.S.Trivedi, Probability and Statistics with Reliability, Queuing and computer science Applications, John wiley and sons, 2nd edition, 2012.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Apply probability theory and random variable as a need for the analysis of random experiment.	Apply
CO2	Use discrete and continuous probability distributions including requirements, mean and variance for making decisions.	Apply
CO3	Distinguish correlation and linear regression in two dimensional random variables.	Apply
CO4	Apply Markov for modeling sequential decision problems.	Apply
CO5	Compare auto correlation, cross correlation, power spectral density, cross spectral density and its properties.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	1	-	-
CO	3	2	-	-	-	-	-	-	-	-	-	1	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER III

U19AD302	FOUNDATIONS OF DATA SCIENCE	Category: PC			
		L	T	P	C
		3	0	0	3

PRE–REQUISITES:

- Problem Solving using Python Programming

COURSE OBJECTIVES:

- To learn basics of data science and statistical inference.
- To understand the concept of data pre-processing and feature selection algorithms.
- To visualize the processed data using visualization techniques.

UNIT I INTRODUCTION AND EXPLORATORY DATA ANALYSIS 10

Big data and data science - Big data analytics - Business intelligence vs big data, big data frameworks - Current landscape of analytics, data visualization techniques, visualization software - Exploratory Data Analysis (EDA), statistical measures - Basic tools (plots, graphs and summary statistics) of EDA - Data analytics lifecycle, Discovery.

UNIT II BASIC STATISTICAL INFERENCE AND REGRESSION MODELS 9

Developing initial hypotheses - Identifying potential data sources - EDA case study, testing hypotheses on means, proportions and variances - Regression models: Simple linear regression, least-squares principle - MLR, logistic regression - Multiple correlation - Partial correlation.

UNIT III LINEAR ALGEBRA BASICS 8

Matrices to represent relations between data - Linear algebraic operations on matrices – Matrix decomposition: Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

UNIT IV DATA PRE-PROCESSING AND FEATURE SELECTION 10

Data cleaning - Data integration - Data reduction - Data transformation and data discretization, Feature generation and feature selection, Feature selection algorithms: Filters- Wrappers - Naive Bayes - k-Nearest Neighbors (k-NN), k-means - Decision trees - Random forests.

UNIT V DATA VISUALIZATION 8

Overview of data visualization - Data abstraction - Task abstraction - Analysis: Four levels for validation, Human visual perception - Visualization techniques - Designing effective visualizations.

Contact Periods:

Lecture: 45 Periods Tutorial: - Periods Practical: – Periods Total: 45 Periods

TEXT BOOKS:

1. Jure Leskovek, Anand Rajaraman and Jefrey Ullman, “Mining of Massive Datasets” v2.1, Cambridge University Press. (2019). (free online)
2. Seema Acharya, Subhasini Chellappan, “Big Data Analytics”, paperback 2nd ed, Wiley (2019).

REFERENCES:

1. Cathy O'Neil and Rachel Schutt, “Doing Data Science, Straight Talk From The Frontline”, O'Reilly (2014).
2. Jiawei Han, Micheline Kamber and Jian Pei, “Data Mining: Concepts and Techniques”, Third Edition, ISBN 0123814790, (2011).
3. Jay Liebowitz, “Big Data and Business Analytics”, CRC press (2013)
4. C. Rajan, “Data mining methods” ,2nd edition, Narosa (2016).

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Interpret data science basics, exploratory data analysis and its tools.	Understand
CO2	Demonstrate the usage of statistical inference and regression models	Apply
CO3	Use the concept of linear algebra in principal component analysis.	Apply
CO4	Understand and apply the various data pre-processing methods, feature selection algorithms.	Apply
CO5	Implement the visualization of data using the visualization tools.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	2	-	-
CO4	3	3	3	2	-	-	-	-	-	-	-	2	-	-
CO5	3	3	3	2	-	-	-	-	-	-	-	2	-	-
CO	3	3	3	2	-	-	-	-	-	-	-	2	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)							3: Substantial (High)			

SEMESTER III

U19AD303	DATABASE MANAGEMENT SYSTEMS	Category: PC			
		L	T	P	C
		2	0	2	3

PRE–REQUISITES:

- Data Structures

COURSE OBJECTIVES:

- To learn the fundamentals of data models and database design
- To study SQL and relational database design.
- To understand indexing and hashing techniques which helps in physical DB design.

UNIT I RELATIONAL DATABASE 6

Introduction to DBMS : Purpose, Views of data, Data Models, Database System Architecture - Relational databases - Relational Model – Keys - Relational Algebra - SQL fundamentals.

UNIT II DATABASE DESIGN 6

Entity-Relationship model, Diagrams - Functional Dependencies - Non-Loss Decomposition – Normalization and its types.

UNIT III TRANSACTIONS 6

Transaction Concepts, ACID Properties – Schedules – Serializability - Concurrency Control - Locking Protocols – Deadlock - Transaction Recovery - SQL for Concurrency and Recovery.

UNIT IV IMPLEMENTATION TECHNIQUES 6

RAID - File Organization – Organization of Records in Files - Indexing and Hashing - Ordered Indices - B+ tree Index Files – Hashing and its types.

UNIT V NoSQL DATABASE SYSTEMS 6

Introduction and classification to NoSQL Database Systems: Graph Databases, Key-Value Stores, Document Stores -Columnar Databases - NoSQL vs SQL.

LIST OF EXPERIMENTS

11. DDL and DML Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
12. Database Querying – Simple queries, Nested queries, Sub queries and Joins
13. Views, Sequences, Synonyms
14. Database Programming: Implicit and Explicit Cursors
15. Procedures and Functions
16. Triggers
17. Exception Handling and normalization and Implementation for any application

Contact Periods:

Lecture: 30 Periods Tutorial: – Periods Practical: 30 Periods Total: 60 Periods

TEXT BOOKS:

5. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata Mc Graw Hill, 2011.
6. RamezElmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education, 2010.

REFERENCES:

7. C.J.Date, A.Kannan and S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2012.
8. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, Tata Mc Graw Hill, 2010.
9. G.K.Gupta, “Database Management Systems”, Tata Mc Graw Hill, 2011.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Understand the fundamentals of Database Management Systems	Understand
CO2	Formulate solutions to real time problems using SQL	Apply
CO3	Apply normalization techniques for database design.	Apply
CO4	Apply concurrency control and recovery mechanisms.	Apply
CO5	Compare the various storage and optimization mechanisms	Analyze

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	1	-	2	-	-
CO2	3	2	2	2	2	-	-	-	-	2	-	2	-	-
CO3	2	2	2	-	-	-	-	-	-	1	-	2	-	-
CO4	2	2	-	-	-	-	-	-	-	1	-	2	-	-
CO5	3	2	2	2	-	-	-	-	-	-	-	2	-	-
CO	2	2	2	2	2	-	-	-	-	1	-	2	-	-
Correlation levels: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)														

SEMESTER III

U19AD304	OBJECT ORIENTED PROGRMMING USING JAVA	Category: PC			
		L	T	P	C
		3	0	0	3

PRE–REQUISITES:

- Programming basics
- Computational Thinking

COURSE OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of packages, inheritance and interfaces
- To develop a java application with threads and generics classes

UNIT I INTRODUCTION TO OOP 9

A look at procedure-oriented programming – Object oriented programming paradigm – Basic concepts of object-oriented programming – Benefits of OOP – Introduction to Java – Characteristics – JRE – JDK. Fundamental Programming Structures in Java – Defining classes in Java – Simple Java program.

UNIT II JAVA BASIC ELEMENTS AND INHERITANCE 9

Constructors, Methods – Access specifiers – Data Types, Variables, Operators, Control Flow, Arrays, Packages - Javadoc comments. Inheritance – Super classes- Sub classes –Protected members – Constructors in sub classes- Object class – abstract classes and methods- final methods and classes.

UNIT III INTERFACES AND EXCEPTION HANDLING 9

Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -Inner classes, Array Lists – Strings. Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements.

UNIT IV I/O AND MULTITHREADING 9

Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files. Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups.

UNIT V EVENT DRIVEN PROGRAMMING 9

Graphics programming – Frame – Components – working with 2D shapes – Using color, fonts, and images – Basics of event handling – event handlers – adapter classes – actions – mouse events – AWT event hierarchy – Introduction to Swing – layout management – Swing Components – Text Fields , Text Areas – Buttons- Check Boxes – Radio Buttons – Lists- choices- Scrollbars – Windows –Menus – Dialog Boxes.

Contact Periods:

Lecture: 45 Periods Tutorial: - Periods Practical: – Periods Total: 45 Periods

TEXT BOOKS:

1. Sachin Malhotra, Saurabh Choudhary, “Programming in Java”, Revised Second Edition, Oxford, 2018.
2. Herbert Schildt, “Java The complete reference”, 8th Edition, McGraw Hill Education, 2011.
3. Cay S. Horstmann, Gary cornell, “Core Java Volume –I Fundamentals”, 9th Edition, Prentice Hall, 2013.

REFERENCES:

1. Paul Deitel, Harvey Deitel, “Java SE 8 for programmers”, 3rd Edition, Pearson, 2015.
2. Steven Holzner, “Java 2 Black book”, Dreamtech Press, 2011.
3. Timothy Budd, “Understanding Object-oriented programming with Java”, Updated Edition, Pearson Education, 2000.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Demonstrate the fundamentals of object-oriented programming using java	Apply
CO2	Implement the concepts of inheritance and packages using java.	Apply
CO3	Build java applications using exceptions and interfaces.	Apply
CO4	Develop java applications using multi-threading and i/o.	Apply
CO5	Illustrate interactive java programs.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	2	2	1	-	-	-	-	-	-	3	-	-
CO2	-	-	2	3	2	-	-	-	-	-	-	3	-	-
CO3	-	-	3	3	2	-	-	-	-	-	-	3	-	-
CO4	-	-	3	3	2	-	-	-	-	-	-	3	-	-
CO5	-	-	2	2	1	-	-	-	-	-	-	3	-	-
CO	-	-	2	3	2	-	-	-	-	-	-	3	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER III

U19AD305	COMPUTING ESSENTIALS	Category: ES			
		L	T	P	C
		3	0	0	3

PRE–REQUISITES:

- Nil

COURSE OBJECTIVES:

- To understand the I/O and Memory Interfacing circuits of the computer
- To understand the concepts and functions of operating systems.
- To understand the concepts of networking.

UNIT I Computer Organization and Microprocessors 9

Introduction – Types and Evolution of computers - CPU organization and data path - Principles of RISC and CISC and their design principles, – Features and evolution of Intel x86 architecture, Performance assessment of processors – Evolution and Architecture of microprocessors and microcontrollers : 8086, Intel Processors, 8051, Raspberry Pi.

UNIT II Memory and I/O Organization 9

Characteristics of memory systems and memory hierarchy - Static and dynamic memory, Synchronous DRAM and its bus cycle, Principles and operations : Cache memory -SSD - flash memory - magnetic disks - DMA operation – Bus Structure and its operations - Overview of programmed I/O and interrupt driven I/O techniques.

UNIT III Fundamentals of Operating Systems 9

Operating System types, Structure and Operations- System Calls, System Programs, OS Generation and System Boot - Processes, CPU Scheduling, Process synchronization, Deadlock : Detection, Prevention, Avoidance, Recovery.

UNIT IV Storage Management in Operating Systems 9

Main Memory – swapping, Paging, Segmentation, Virtual Memory – File System structure, Allocation methods, free space management, Disk Structure, Disk Scheduling, Swap - Space Management.

UNIT V Network Fundamentals 9

Principles of Networking : Types of Networks - Networking Concepts and Technologies – Evolution and working of network generations - Physical Components and topologies of Networks - Ethernet Standards - OSI and TCP/IP Data Models - Configure a NIC and a Modem

Contact Periods:

Lecture: 45 Periods Tutorial: - Periods Practical: – Periods Total: 45 Periods

TEXT BOOKS:

1. Andrew S Tanenbaum and Todd Austin, Structured Computer Organization, Sixth edition, Pearson, 2013.
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, 9th Edition, John Wiley and Sons Inc., 2012.
3. Behrouz A Forouzan, “Data Communications and Networking”, Fifth edition, Tata McGraw–Hill, New Delhi, 2013.
4. David Anfinson, IT- Essentials – PC hardware and software companion guide, 3rd edition, CISCO networking academy.

REFERENCES:

1. Yu-Cheng Liu, Glenn A.Gibson, “Microcomputer Systems: The 8086 / 8088 Family – Architecture, Programming and Design”, Second Edition, Prentice Hall of India, 2016.
2. Ramaz Elmasri, A. Gil Carrick, David Levine, Operating Systems - A Spiral Approach, Tata McGraw Hill Edition, 2010.
3. J.F. Kurose, K.W. Ross, “Computer Networking: A Top-Down Approach”, 6th Edition, Addison-Wesley, 2017.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Describe the basic structure and operation of a digital computer.	Understand
CO2	Elaborate the operations of memory in computer systems.	Understand
CO3	Exemplify the CPU scheduling and deadlock handling mechanisms.	Understand
CO4	Interpret various memory and storage management techniques.	Understand
CO5	Summarize the principles of networking and its topologies.	Understand

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	2	2	2	-	-	-	-
CO	2	2	2	-	-	-	-	2	2	2	-	-	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER III

U19AD306	DATA SCIENCE LABORATORY	Category: PC			
		L	T	P	C
		0	0	2	1

PRE–REQUISITES:

- Problem Solving using Python Programming

COURSE OBJECTIVES:

- To use map-reduce, join in big data and to perform statistical inference.
- To implement linear regression and to validate the regression using various tests.
- To perform visualization on different data sets.

LIST OF EXPERIMENTS

22. Exploratory data analysis.
23. Data correlation analysis using different tests.
24. Implement Association Rule Mining using FP Growth.
25. Simple linear regression.
26. Multiple regression.
27. Principal component analysis.
28. Implement Decision Tree learning.
29. Implement K-means Clustering to Find Natural Patterns in Data.
30. Data visualization experiments.
31. Data Handling Project possibly from Kaggle, DevMesh.

Contact Periods:

Lecture: – Periods Tutorial: – Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Apply map-reduce, join, association rules in big data.	Apply
CO2	Apply statistical methods to hypotheses testing and inference problems	Apply
CO3	Implement simple linear regression and to perform tests to validate the regression.	Apply
CO4	Implement the EDA using the principal component analysis technique.	Apply
CO5	Apply different visualization techniques on various massive datasets.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	-	-	-	2	-	2	2	-	-
CO2	3	3	3	2	2	-	-	-	2	-	2	2	-	-
CO3	3	3	3	2	2	-	-	-	2	-	2	2	-	-
CO4	3	3	3	2	2	-	-	-	2	-	2	2	-	-
CO5	3	3	3	2	2	-	-	-	2	-	2	2	-	-
CO	3	3	3	2	2	-	-	-	2	-	2	2	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				

SEMESTER III

U19AD307	OBJECT ORIENTED PROGRAMMING LABORATORY	Category: PC			
		L	T	P	C
		0	0	2	1

PRE–REQUISITES:

- Programming basics
- Computational Thinking

COURSE OBJECTIVES:

- To build software development skills using java programming for real-world applications
- To understand and apply the concepts of classes, packages, interfaces, exception handling and file processing
- To develop applications using generic programming and event handling

SUGGESTED LIST OF EXPERIMENTS

1. i. Write a Java program that determines the number of days in a month.
   ii. Write a java program that arranges the given set of strings in alphabetical order. Supply the strings through command line.
2. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, and type of EB connection (i.e domestic or commercial). Compute the bill amount using the following tariff:
   If the type of the EB connection is domestic, calculate the amount to be paid as follows:
   - First 100 units - Rs. 1 per unit
   - 101-200 units - Rs. 2.50 per unit
   - 201 -500 units - Rs. 4 per unit
   - 501 units - Rs. 6 per unit

   If the type of the EB connection is commercial, calculate the amount to be paid as follows:
   - First 100 units - Rs. 2 per unit
   - 101-200 units - Rs. 4.50 per unit
   - 201 -500 units - Rs. 6 per unit
   - 501 units - Rs. 7 per unit
3. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.
4. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
5. Create an interface “CreditCardInterface” with methods to viewCreditAmount, viewPin, changePin and payBalance. Create a class Customer (name, card number, pin, creditAmount –

initialized to 0). Implement methods of the interface “CreditCardInterface” in Customer class. Create an array of customer objects and perform the following actions.

- Pay Balance
- Change Pin

6. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
7. Write a Java application for banking transaction system that helps the users to do their credit transactions. Rises user defined exception while encountering errors during credit transaction and also solves the exception by using appropriate handling techniques.
8. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
10. Develop an interactive program using java.

Contact Periods:

Lecture: – Periods Tutorial: – Periods Practical: 45 Periods Total: 45 Periods

COURSE OUTCOMES:

Upon completion of the course, the student will be able to

COs	Statements	K-Level
CO1	Write java programs that make use of classes, objects, interfaces and packages.	Apply
CO2	Implement abstraction and inheritance using java programs.	Apply
CO3	Create programs that perform exception handling and multiple inheritance.	Apply
CO4	Build multithreaded java programs and i/o operations.	Apply
CO5	Develop applications using collections and applets.	Apply

COURSE ARTICULATION MATRIX:

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	1	2	2	-	3	-	-
CO2	3	2	2	-	-	-	-	1	2	2	-	3	-	-
CO3	3	2	3	-	-	-	-	1	2	2	-	3	-	-
CO4	3	2	2	-	-	-	-	1	2	2	-	3	-	-
CO5	3	2	3	-	-	-	-	1	2	2	-	3	-	-
CO	3	3	2	-	-	-	-	1	2	2	-	3	-	-
Correlation levels:	1: Slight (Low)			2: Moderate (Medium)						3: Substantial (High)				