



**Scheme of Instruction & Syllabi
of
Bachelor of Technology
(Computer Science and Engineering)
With specialization in Artificial Intelligence
(With effective from academic session 2023-24)**

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HOD CSE**

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Invertis Village, Bareilly-Lucknow NH-24, Bareilly,
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STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
B. Tech. in Computer Science & Engineering
with specialization in Artificial Intelligence
YEAR I, SEMESTER I

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Ability Enhancement	ENG 105	English Communication	2	1	0	25	50	75	3
2	Engineering Science Course	BCSAI 101	Engineering Mathematics	3	0	0	25	50	75	3
3	Engineering Science Course	BCSAI 102	Elements of Computing System	3	0	0	25	50	75	3
4	Engineering Science Course	BEE 101	Introduction to Electrical and Electronics Engineering	3	0	0	25	50	75	3
5	Engineering Science Course	BCSAI 103	Programming in C	3	0	0	25	50	75	3
6	Engineering Science Course	IOT1	Introduction to IOT Foundation	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
6	Engineering Science Course	BCSAI 104	Computing Systems Lab	0	0	4	15	35	50	2
7	Engineering Science Course	BEE 102	Basic Electrical and Electronics Engineering Lab	0	0	4	15	35	50	2
8	Engineering Science Course	BCSAI 105	Programming in C Language Lab	0	0	4	15	35	50	2
9	Skill Enhancement	ENG 113	Communications-I Lab	0	0	4	15	35	50	2
TOTAL				18	1	16	215	460	675	27

L-Lecture, T- Tutorial , P- Practical ,CA- Continuous Assessment, EE- End Semester Examination

STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
B. Tech. in Computer Science & Engineering
specialization in Artificial Intelligence
YEAR I, SEMESTER II

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Engineering Science Course	BCSAI 201	Discrete Mathematics	3	0	0	25	50	75	3
2	Engineering Science Course	BCSAI 202	Statistical Learning	3	0	0	25	50	75	3
3	Science	CHY 103	Environmental Studies	2	0	0	15	35	50	2
4	Engineering Science Course	BCSAI 203	Design Thinking	3	0	0	25	50	75	3
5	Engineering Science Course	BCSAI 204	Operating System-Building Blocks	3	0	0	25	50	75	3
6	Engineering Science Course	BCSAI 205	Digital Electronics	3	0	0	25	50	75	3
7	Engineering Science Course	IOT2	Communication and Standard Interfaces	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
7	Engineering Science Course	BCSAI 206	Digital Electronics Lab	0	0	4	15	35	50	2
8	Engineering Science Course	BCSAI 207	Computer Aided Graphics & Drafting (Lab)	0	0	4	15	35	50	2
9	Skill Enhancement	ENG 114	Business & Technical Communication (Lab)	0	0	4	15	35	50	2
			TOTAL	21	0	12	215	460	675	27

L-Lecture, T- Tutorial , P- Practical ,CA- Continuous Assessment, EE- End Semester Examination

ENG 105: ENGLISH COMMUNICATION

2L + 1T + 0P + 3C

MM 100

Unit 1: Prose- A Cup of Tea by Katherine Mansfield, The Piece of String by Guy De Maupassant, Text of Steve Jobs' Commencement address -2005.

Poems: Ode to the skylark – by P B Shelley, Where the Mind Is Without Fear – by Rabindranath Tagore, The Road Not Taken- Robert Frost.

Unit 2: Grammar & Vocabulary- Tenses and the concept of time, Verb Types, Active and Passive Voice, Narration, Prepositions, Conditionals, Modal Auxiliaries, Conjunctions, One- word substitutions, Synonyms and Antonyms.

Unit 3: Writing Skills- Writing Paragraph, Essay, Writing Articles for Newspapers & Magazines, Writing Applications, Resumé Writing.

Unit 4: Reading Skills- Reading Comprehension, Summarizing and Note making.

Unit 5: Speaking Skills- Conversations- Introduction, Purpose, Features, Delivering Speeches- Welcome, Introductory, Vote of Thanks, Farewell Speech, Indianism.

Text/Reference Books

1. Communication Skills, Pushp Lata & Sanjay Kumar, Oxford Higher Education/Oxford University Press.
2. Technical Communication; Principles and Practice, Meenakshi Raman & Sangita Sharma, Oxford University Press.
3. Effective Technical Communication, M Ashraf Rizvi, Tata Mcgraw Hill.

BCSAI 101: ENGINEERING MATHEMATICS

3L + 0T + 0P + 3 C

MM 100

Unit 1: Differential Equation - Differential equations of first order and first degree - Linear differential equations, Reducible to linear form, Exact Form, Reducible to Exact Form, Second order ordinary differential equations with variable coefficients- Homogeneous form, Exact form, Series Solutions of Second Order Linear Differential Equations with Variable Coefficients (complementary functions only), Partial Differential Equations of First Order: Lagrange's Form, Standard Forms.

Unit 2: Differential Calculus -Partial Differentiation, Euler's Theorem on Homogeneous Functions, Approximate Calculations, Maxima and Minima of two and more independent variables, Lagrange's Method of Multipliers, Asymptotes (Cartesian co-ordinates only), Curve Tracing (Cartesian and Standard Polar Curves).

Unit 3: Integral Calculus- Area of Curves, Rectification, Surface and Volume of Solids of Revolution, Double and Triple Integrals, Double Integral by changing into polar form, Area and Volume by Double Integration, Change of Order of Integration, Beta Function and Gamma Function (Simple Properties).

Unit 4: Matrices- Rank of a matrix, Rank of matrix by reducing to normal forms, Consistency and redundancy of systems of simultaneous linear equations and its solution, Eigen values and Eigen vectors, Cayley- Hamilton theorem (without proof), Diagonalization of matrix.

Unit 5: Vector Calculus- Scalar and vector fields, Differentiation and Integration of vector functions, Directional derivatives, Gradient, Divergence and Curl.Line, Surface and volume Integrals. Green's theorem in a plane, Gauss's and Stoke's theorem (without proof) and their applications

Text/Reference Books

1. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw Hill.
2. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition
3. Calculus and Analytical Geometry, Thomas and Finney, Narosa Publishing House(New Delhi)
4. Integral Calculus, Shanti Narayan, S. Chand.
5. Differential Calculus, Shanti Narayan, S. Chand.
6. Ordinary and Partial differential equations, M. D. Raisinghania, S. Chand.
7. Calculus, Thomas & Finney, Narosa Publishing House(New Delhi).

BCSAI 102: ELEMENTS OF COMPUTING SYSTEM

3L + 0T + 0P + 3C

MM 100

Unit 1: Register Transfer and Micro-operation

Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. Arithmetic Micro-operations: Binary Adder, Binary Adder- Subtractor, Binary Incrementor, Logic Micro-operations.

Unit 2: Basic Computer Organization and Control Unit

Instruction Codes, Computer Registers: Common bus system, Computer Instructions: Instruction formats, Instruction Cycle: Fetch and Decode. Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines, Design of Control Unit, Central Processing Unit: Introduction, General Register Organization, Stack Organization stack; Instruction Formats, Addressing Modes

Unit 3: Computer Arithmetic

Introduction, Addition and Subtraction, Multiplication Algorithms (Booth algorithm), Division Algorithms, Input – Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors

Unit 4: Modes of Data Transfer and Memory Organization

Modes of Data Transfer: Priority Interrupt, Direct Memory Access, Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory

Unit 5: Introduction to Information Storage: Information Storage, Evolution of Storage Architecture

Data Center Environment: Application, Host (Computer), Connectivity, Storage, Host Access to Data, Direct-Attached Storage, Storage Design Based on Application

Data Protection (RAID): RAID Implementation Methods, RAID Array Components, RAID Techniques, RAID Levels, RAID Impact on Disk Performance, RAID Comparison

Text /Reference Books:

1. Computer System Architecture by Morris Mano, PHI
2. Computer Organization and Architecture by William Stallings, PHI
3. Information Storage and Management (Storing Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments) 2nd Edition by Somasundaram Gnanasundaram Alok Shrivastava.
4. Digital Computer Electronics: An Introduction to Microcomputers by Malvino, TMH
5. PC Hardware in a Nutshell by Barbara Fritchman Thompson, Robert Bruce Thompson, O'Reilly, 2nd Edition , 2010
6. Fundamentals of Computer Organization and Architecture by Mostafa AB-EL-BARR and Hesham EL-REWNI, John Wiley and Sons
7. Storage Management in Data Centers: Understanding, Exploiting, Tuning, and Troubleshooting Veritas Storage Foundation by Volker Herminghaus and Albrecht Scriba.

**BEE 101: INTRODUCTION TO ELECTRICAL AND ELECTRONICS
ENGINEERING****3L + 0T + 0P + 3 C****MM 100**

Unit 1: Basic Electrical Quantities: -Basic concept of charge, current, voltage, resistance, power, energy and their units, Conversion of units of work, power and energy from one form to another. Electrical Energy: Difference between ac and dc and their applications, Classification of two terminal elements, Energy Sources, Source Transformation, ideal independent two terminal electrical sources.

DC Networks: Ohm's law, resistances, capacitances & inductors in series and parallel, Kirchhoff's laws and their applications in solving electrical network problems, Node Voltage and Mesh Current Analysis, Star-delta transformation.

Unit 2: Network theorems: Thevenin Theorem, Norton Theorem and Superposition Theorem, Statement and applications including dependent sources.

Transformer: Faraday's Law of Electromagnetic Induction, Construction and Operation of Single-Phase Transformer, EMF Equation, Voltage & Current Relationship and Phasor Diagram of Ideal Transformer.

Unit 3: AC Fundamentals: Concept of alternating current and voltage, Generation of Single-Phase AC Voltage, EMF Equation, Average, RMS and Effective Values Representation of alternating sinusoidal quantities by vectors, Phasor algebra (addition, subtraction, multiplication and division of complex quantities). RL, RC & RLC Series-Parallel Circuits, Complex Representation of Impedances, Reactance, Phasor Diagram, Power and Power Factor.

Unit 4: Review of Semiconductors: Semiconductors, conductors and insulators, intrinsic and extrinsic semiconductors and conduction in semiconductors.

Semiconductor Physics: Basic material properties of semi-conductors, governing factors for Fermi-level, carrier concentration and carrier mobility, recombination and carrier lifetime, carrier drift, diffusion, Hall effect and continuity equation.

Unit 5: Junction Diodes: Introduction, forward and reverse biasing of diode, voltage current characteristic of diode, diode models, half wave rectifier, full wave rectifier, Zener diode and its application.

Bipolar Transistor: Transistor structure, basic transistor operation, common base configuration and its characteristics, transistor amplifying action, common emitter configuration and its characteristics, common collector configuration, limit of operation, the dc operating point and biasing techniques (fixed bias, voltage divide bias, voltage feedback type, current feedback type, and combination of voltage and current feedback types)

Text/Reference Books

1. Integrated Electronics Analog and Digital Circuits & Systems, J. Millman & C.C. Halkias, McGraw Hill.
2. Electronic Devices and Integrated Circuits, B. P. Singh & Rekha Singh, Pearson Education.
3. Theory and problems of Basic Electrical Engineering, D.P. Kothari & I. J. Nagrath, PHI.
4. Basic Electrical Engineering, V.N. Mittal & A. Mittal, TMH.
5. Solutions of problems in Electrical Engineering, Smith Parker, CBS Publisher.
6. Electronics Devices & Circuit Theory, Boylestad & Nashelsky, Prentice Hall of India.

BCSAI 103: PROGRAMMING IN C**3L + 0T + 0P + 3C****MM 100**

Unit 1: Introduction: -What is a program? What is a programming language? Steps in Programming, Skills needed to do programming, A little introduction to C, writing a Program, Fundamentals of a Programming Language, Different Programming Techniques, Procedural Programming, Modular Programming, Object Oriented Programming, Getting started with compiler. Words and Sentences in C Language: Alphabets in C, Keywords in C, Rules of forming Words in C language, Data Variables, Data Types and Rules for naming and declaring data, variables, Basic Data Types in C, Constants, Comments in C.

Unit 2: Instructions and Rules for Writing: -Types of instructions, Data Manipulation Instructions, Input/output Instructions, Flow Control Instructions: Decision Control Instructions, If, if-else, If-else-if, Nested if-else, Loop Control Instructions, For Loop, While Loop, Do While, Selection Instructions.

Unit 3: Functions: -Why use Functions, Components of Function, Name of a function, Body of a function, Local variables of a function, Parameters or Arguments to a function, Return Values, Prototype of a function.
Arrays: What is an array? Array Declaration, Array Initialization, accessing individual elements of an array, Two Dimensional Arrays, passing an array element to a function, Rules of using an array.

Unit 4: Pointers: -What is a pointer? Declaring a Pointer variable, initializing a pointer variable, Using a Pointer Variable, Pointer Arithmetic, Pointers and array, passing an entire array to a function.
Strings: What are strings? String I/O, String Manipulation Functions.

Unit 5: Structures: -Declaring and Accessing Structure, variables Uses of Structures, Unions Storage Classes and Scoping: Automatic, Register, External, Static, Scope of a Variable File Input/Output: Command-line arguments, File Input and Output, Combining Command-line Arguments and File I/O.

Text/Reference Books

1. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Prentice-Hall (New Delhi).
2. C Programming: A Modern Approach, K. N. King, Prentice-Hall (New Delhi).
3. C Primer Plus, Stephen Prata, Sams.
4. Practical C Programming, Steve Oualline, O'Reilly Media.
5. Let us C, Yashwant Kanetkar, BPB Publications.
6. Pointers in C, Yashwant Kanetkar, BPB Publications.

BCSAI 104: COMPUTING SYSTEM LAB

0L + 0T + 4P + 2C

MM 100

List of Experiments:

1. Given a PC, name its various components and list their functions
2. Identification of various parts of a computer and peripherals
3. DOS Basic Commands
4. Exercises on entering text and data (Typing Practice)
5. Installation of Windows Operating System using pen- drive, CD & Virtual Machine
6. Configuring the Directly Attached Disks for Basic and Dynamic Disks
7. Creating and configuring the disk partitions and volumes for the disk in Windows/Linux System
8. Creating and Configuring the RAID 0, 1 and RAID5 in windows server 2012 R2
9. Configuring the Network Share using Windows Server 2012 R2
10. Configuring the File Server in Windows Server 2012 R2
11. Configuring NFS in Linux Server
12. Configuring the iSCSI in Windows Server 2012 R2
13. Configuring FCOE in Windows Server 2012 R2
14. Creating a System Backup and Restoring in Windows Server and Linux System
15. Creating and Restoring the Snapshot for Virtual Machines in Hyper-V

BEE 102: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

0L + 0T + 4P + 2C

MM 100

Electrical Lab:

1. To verify Ohm's Law
2. Verification of Kirchoff's Law applied to the DC circuits.
 - (a) Parallel and Series combination
 - (b) Identification of node points
 - (c) Algebraic sum of current at node points
 - (d) Algebraic sum of e.m.f.s and voltage drops.
3. To construct a RLC series circuit and measure its impedance, inductive (X_L) and capacitive reactance (X_C), measure phase angle between voltage and current.
4. Make house wiring including earthing for 1-phase energy meter, MCB, ceiling fan, tube light, three pin socket and a lamp operated from two different positions.
5. Study the construction & basic working of ceiling fan. Connect ceiling fan along with regulator through auto-transformer to run and vary speed.
6. Study the construction and connection of single-phase transformer and auto-transformer. Measure input and output voltage and fin turn ratio.
7. Study the construction, circuit, working and application of the following lamps.
 - (a) Fluorescent Lamp, (b) Sodium Vapour Lamp (c) Mercury vapour lamp (d) Halogen Lamp

Electronics Lab:

1. Study the following devices:
 - (a) Analog & digital multimeters
 - (b) Function/ Signal generators
 - (c) Regulated d. c. power supplies (constant voltage and constant current operations)
 - (d) Study of analog CRO, measurement of time period, amplitude, frequency & phase angle using Lissajous figures.
2. Identification, testing and applications of Resistors, Inductors, Capacitors, PN-diode, SCR, TRIAC, Photo Diode, Zener diode, LED, LCD, BJT, Photo Transistor.
3. Plot V-I characteristic of P-N junction diode & Zener diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances. Application of Diode as clipper & clamper.
4. Plot input and output characteristics of BJT in CE configurations. Find its h parameters. Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
5. Study half wave rectifier and bridge rectifier and effect of filters on wave. Also calculate theoretical & practical ripple factor.

BCSAI 105: PROGRAMMING IN C LANGUAGE LAB**0L + 0T + 4P + 2C****MM 100****Basic Calculation:**

1. Write a c program to display your Name, address and city in different lines.
2. Write a c program to perform all arithmetic operations.
3. Write a c program to convert the Fahrenheit into centigrade. Formula $c = (F-32)/1.8$
4. Write a c program to calculate the simple interest.
5. Write a c program to calculate the compound interest.
6. Write a program in C to display sum of first N natural numbers.
7. Write a c program to find the roots of the quadratic equation.

Conditional Statements

1. Write a C – program which used to determine type of triangle based on sides. Measure of sides input by the user. To check whether the triangle is isosceles, scalene or equilateral triangle. Hint: If all the sides are equal than equilateral, If any two sides are equal than isosceles otherwise scalene.
2. Write a program in C to which allow user to enter any arithmetic operator (+ - * /) and two integer values and display result according to selection of operator.
3. Write a program in C to calculate gross salary of employee using : 1. Gross Salary = Basic Pay + DA + HRA – PF. 2. DA = 30% If Basic Pay < 5000 otherwise DA = 45% of the Basic Pay. 3. HRA = 15% of Basic Pay. 4. PF = 12% of Basic Pay. Only basic pay will input by the user. Display Gross salary – DA – HRA – PF and basic salary
4. Student should fulfill the following criteria for admission: Mathematics ≥ 50 Physics ≥ 45 Chemistry ≥ 60 Total of all subject ≥ 170 OR Total of Mathematics + Physics ≥ 120 Accept the marks of all the three subjects from the user and check if the student is eligible for admission.
5. Write a program in C for grade calculation using if...else if ladder and switch Statement. Accept marks of 3 subjects calculate total and based on it calculate Grade.

Loop Programs

1. Program to display first N prime numbers. N is input by the user.
2. Program to display A to Z in upper case or lower case according to user selection.
3. Program which used to print A to Z and Z to A.
4. Program which ask for party to user until the user say yes
5. Program which ask for party to user until the user say yes
6. Program which check that whether the given number is palindrome or not.
7. Program to check that the given number is Armstrong or not.
8. Program which will display next nearest prime number of given integer number. For example next nearest prime of 5 is 7, for 8 is 11, for 7 is 11 (Using Do while)

ENG 113: COMMUNICATIONS-I LAB

0L + 0T + 4P + 2C

MM 100

1. Self-Awareness

What is Self-Awareness? Introspection, Guide to Self-Awareness and Self Analysis, SWOT Analysis on self

2. Confidence Building

What is Confidence? Important of Confidence Building, 6-steps guide on building Self – Confidence

3. Goal Setting

Purpose of Goal Setting, Importance of Goal Setting, SMART Goals, Performance Goals and Result Goals

4. Professional Grooming and Basic Etiquette

First Impressions, Importance of Professional Grooming, Grooming Guide – Men/ Women, Introduction to Basic Etiquette, Classroom Etiquette/Restroom Etiquette/Telephone Etiquette, General Etiquette

Sentence Formation: Using Noun/Types of Noun, Verbs & its usage, Tense chart using Verbs, Subject-Verb Agreement

Paragraph Writing: Three Essential Elements, Illustration & Application of the Three Elements, how to write an effective paragraph

Rapid Reading: What is Rapid Reading? Importance of Rapid Reading, Simplifying Rapid Reading, Rapid Reading Passages

Public Speaking: Why is Public Speaking important? Three parts to Public Speaking explained, Guide to successful Public Speaking

Time Management: What is Time Management? Importance of Time Management, Managing Time Effectively, Blocks to Effective Time Management

Stress Management: Stress and its Causes, Symptoms of Unmanaged Stress, Managing Stress, Benefits of Stress Management

Presentation Skills: Types of Presentation Communication, A Beginner's Guide to PowerPoint 2013, 4 P's, Delivering Effective Presentation

The Colorful World of Adjectives: Types of Adjectives, Use of Adjective in Sentences, Descriptive Adjective for You.

BCSAI 201 : DISCRETE MATHEMATICS

3L+0T+0P+3C

MM: 100

Unit 1: Formal Logic - Statement, Symbolic Representation and Tautologies, Quantifiers, Predicate and validity, Normal form. Propositional Logic, Predicate Logic, Logic Programming and Proof of correctness.

Unit 2: Proof, Relation And Analysis Of Algorithm Techniques For Theorem Proving - Direct Proof, Proof by Contra position, Proof by exhausting cases and proof by contradiction, principle of mathematical induction, principle of complete induction. Recursive definitions, solution methods for linear, first-order recurrence relations with constant coefficients.

Unit 3: Graph Theory - Graphs - Directed and Undirected, Eulerian chains and cycles Hamiltonian chains and cycles, Trees, chromatic number, connectivity and other graphical parameters Applications. Polya's Theory of enumeration and its applications.

Unit 4: Sets And Functions - Sets, relations, functions, operations, equivalence relations, relation of partial order, partitions, binary relations. Transforms: Discrete Fourier and Inverse Fourier Transforms in one and two dimensions, discrete Cosine transform.

Unit 5: Monoids And Groups - Groups, Semi groups and Monoids cyclic semi groups and sub monoids, Subgroups and cosets. Congruence relations on semi groups. Morphism, Normal sub groups. Structure off cyclic groups, permutation groups and dihedral groups elementary applications in coding theory.

Text/Reference Books:

1. C.I.Liu; elements of Discrete Mathematics Tata McGraw Hill publishing Company Ltd., 2000
2. Richard Johnsonbaugh discrete mathematics Pearson Asia 2001.
3. John Truss: Discrete Mathematics for Computer Scientists, Pearson Education, Asia, 2001.
4. Robert J. Mc Eliece: Introduction to Discrete Mathematics, Tata Mc. Graw Hill, India.
5. Lipschutz: Discrete Mathematics, Tata Mc. Graw Hill India.
6. Kenneth H. Rosen, Discrete mathematics and Applications, Tata Mc. Graw Hill

BCSAI 202: STATISTICAL LEARNING**3L + 0T + 0P + 3C****MM 100**

Unit 1: Introduction to Statistics-History and evolution of statistics, types of data, important terminologies, contingency table, frequency and cross table, graphs, histogram and frequency polygon, Random variables, statistical properties of random variables, Expectation, , jointly distributed random variables, moment generating function, characteristic function, limit theorems.

Unit 2: Measures of Central Tendency and Dispersion- Descriptive Statistics, Mean: Arithmetic, Geometric and Harmonic means, mathematical relationship among different means, median for raw data and grouped data, mode for raw data and grouped data, relationship among mean, median and mode, measure of dispersion – standard deviation, variance, covariance and its properties, coefficient of variation, quartiles, quartile deviation and mean deviation, Mean absolute deviation.

Unit 3: Testing of Hypothesis- Introduction to testing of hypothesis, Statistical assumptions, Level of significance, confidence level, Type I Error, Type II error, Critical value, power of the test, Application of small sample test – t and F test, Large Sample test – Z test in Data Science Industry with small use cases (application oriented).

Unit 4: Analysis of Variance (ANOVA)- Introduction to general linear model, assumptions of ANOVA, factors and levels in ANOVA, layout of one way ANOVA, skeleton of one way ANOVA, multiple comparison of sample means, one way analysis of variance with unequal sample sizes, two factor analysis of variance – introduction and parameter estimation, two way analysis of variance with interaction, Post ANOVA: testing of hypothesis for significance of mean using Fishers Least Significance Difference test (lsd), Tukeys test, Dunnet test, Duncan Multiple Rangetest.

Unit 5: Regression and Correlation- Introduction to linear model, concepts of factor, effect, residuals, dependency, independency, assumptions of linear model, estimation of parameters using OLS, properties of regression coefficients, Spurious regression concepts, significance of regression coefficients using t test and F test, concepts of auto correlation, multiple linear regression analysis, multi collinearity, heteroscedasticity, significance of estimated parameters in multiple linear regression, partial test for the individual significance, correlation analysis, properties of correlation coefficients, significance of single correlation coefficient, significance of multiple correlation coefficients, concepts of multiple correlation and partial correlation.

Text /Reference Books:

1. Fundamentals of mathematical statistics – SC Gupta and VK Kapoor, Sultan Chand & Sons Publication, New Delhi
2. Introduction to Probability and Statistics for Engineers and Scientists, Third Edition - Sheldon M. Ross, Elsevier Publication, Academic Press, UK.
3. An introduction to Probability and Statistical Inference – George Roussas, Academic Press.

CHY 103: ENVIRONMENTAL STUDIES

2L + 0T + 0P + 2C

MM 100

Unit 1: Introduction and natural resources: Multidisciplinary nature and public awareness, renewable and nonrenewable resources and associated problems, forest, water, mineral, food, energy and land resources. Introduction to natural resources, conservation of natural resources and human role.

Unit 2: Ecosystem: Ecological concepts, concept of ecosystems, types of ecosystems, ecosystem structure and functioning, energy flow, food chains and food webs, ecological pyramids.

Unit 3: Biodiversity and Conservation: Definition, genetic species and ecosystem diversity biogeographically, classification of Indian value of biodiversity at national and local levels, India as a mega-diversity nation, treats to biodiversity and endangered and endemic species of India, need for conservation of biodiversity.

Unit 4: Environmental pollution: Definition, causes, effect and control of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, electromagnetic pollution, nuclear hazards, human role in prevention of pollution, solid waste management, disaster management, floods, earthquake, cyclone, and landslide

Firework Safety: Combustion of firework and pollution (noise, smoke, fireworks fallout and residue pollution), heavy metal toxicity due to fireworks and associated health effects.

Unit 5: Social Issue and Environment: Unsuitable to suitable development, urban problem related to energy and water conservation, environment protection act, wild life protection act, forest conservation act, environmental issues, population explosion, and family welfare programme. Environmental and human health HIV, women and child welfare, role of information technology on environment and human health.

Corruption: definition and reasons, details of organizations/agencies working against corruption, role of individual against corruption and mode of action.

Ethics : Meaning , nature, determinants and objectives of ethics, ethics and its relation to values norms and morals, Indian ethos, Swami Vivekananda and ethics.

Text/Reference Books

1. Fundamentals of Environmental Biology, K. C. Agrawal, Nidhi Publishers(Bikaner).
2. Fundamentals of Ecology, E.P. Odum, W.B. Saunders Co. (USA).
3. Fundamentals of Ecology, E. P. Odum, Natraj Publisher (Dehradun).
4. Ecology: Principles and Applications, J. L. Chapman & , M. J. Reiss, Cambridge University Press.
5. Atmospheric pollution, W. Buch , Tata McGraw Hill(TMh)
6. Professional Ethics and Human Values, M. Govindarajan, PHI Learning Private Limited (Delhi).

BCSAI 203: DESIGN THINKING

3L + 0T + 0P + 3C

MM 100

Unit 1: Design Thinking: Foundations of Human Centered Design, Barriers to Innovation and Adoption, Learning by Doing, Understanding Needs in Context.

Unit 2: Design Needs and Interventions: The Ethics of Design Interventions, Design Needs in Education, Engineering and Health & Society.

Unit 3: Empathy in Design: Discovering Explicit and Latent Needs, Qualitative Research: Watching and Listening, Point of View & Problem Reframing, Developing Grounded Theory, Design for Usability.

Unit 4: Ideation, Experimentation and Evolution: Generating and Developing Ideas, Creativity as Teaching and Learning, Prototyping and testing Learning Through Things & Interactions, Express, Test, Cycle

Unit 5: Design Documentation: Representing Design Knowledge, Diffusion of Innovation, Design as research

Text/Reference books:

1. Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, by [Thomas Lockwood](#), Allworth Press, 2010.
2. 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization Book by Vijay Kumar.
3. Design Thinking: Understand – Improve – Apply edited by Hasso Plattner, Christoph Meinel, Larry Leifer, Springer Science & Business Media, 201

BCSAI 204: OPERATING SYSTEM-BUILDING BLOCKS**3L + 0T + 0P + 3C****MM 100**

Unit 1: Introduction to Operating System: Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines.

Unit 2: Process Management: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. **Threads:** Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, threading issues. **CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models. **Process Synchronization:** Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions **Deadlocks:** System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Unit 3: Storage Management: Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging. **Virtual Management:** Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation **File-System Interface:** File concept, Access Methods, Directory structure, File-system Mounting, File sharing, Protection and consistency semantics.

Unit 4: File-System Implementation: File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery **Disk Management:** Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

Unit 5: Protection and Security: Protection: Goals of Protection, Domain of Protection, Access Matrix, and Implementation of Access Matrix, Revocation of Access Rights, Capability- Based Systems, and Language – Based Protection. **Security:** Security Problem, User Authentication, One – Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications.

Text/REFERENCE BOOKS:

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
3. Silberschatz / Galvin / Gagne, Operating System, 6th Edition, WSE (WILEY Publication)
4. William Stallings, Operating System, 4th Edition, Pearson Education.
5. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education

BCSAI 205: DIGITAL ELECTRONICS**3L+0T+0P+3C****MM 100**

Unit 1: Number Systems And Codes: Introduction to number systems, weighted and non-weighted codes, 1's complement, 2's complement, complement arithmetic
Introduction to Boolean algebra: Postulates and theorems of Boolean algebra, Boolean functions, canonical and standard form, simplification of Boolean function using Boolean laws and theorems

Unit 2: Logic Gates: Diode and transistor as a switch, basic logic gates, derived logic gates, block diagrams and truth tables, logic diagrams from Boolean expression and vice versa, converting logic diagram to universal logic, positive logic, negative logic and mixed logic

Unit 3: Simplification Of Boolean Functions: K-map representation, incompletely specified functions, simplification realization with gates, Quine-McCluskey method
Combinational Logic: Analysis and design of combinational circuits, half adder and full adder, half subtractor and full subtractor, binary serial and parallel adder, BCD adder, binary multipliers, magnitude comparator, decoders, encoders, multiplexers, de-multiplexers

Unit 4: Sequential Circuits: Latches, flip-flops, triggering of the flip-flops, master-slave flip-flop, excitation tables, conversion of the flip-flops, analysis and design of clocked sequential circuits, shift registers, counters

Unit 5: Logic Families: Logic gate characteristics (propagation delay, speed, noise margin, fan-in, fan-out, power dissipation), standard logic families (RTL, DCTL, DTL, TTL, ECL, MOS), tri-state devices
Programmable Logic: Introduction to programmable logic array (PLA) & programmable array logic (PAL)

Text/Reference Books:

1. Digital Design, Moris Mano, Pearson Education
2. Digital Fundamental, Floyd and Jain, Pearson Education
3. Digital System: Principles and Applications, Tocci, Pearson Education
4. Digital Electronics, B. P. Singh, DhanpatRai& Sons
5. Modern Digital Electronics, R. P. Jain, Tata McGraw-Hil

BCSAI 206: DIGITAL ELECTRONICS LAB

0L+0T+4P+2C

MM:100

List of Experiments:

1. To study and perform the following experiments:
 - (a) Operation of digital multiplexer and demultiplexer.
 - (b) Binary to decimal encoder.
 - (c) Characteristics of CMOS integrated circuits.
2. To study and perform experiment - Compound logic functions and various combinational circuits based on AND/NAND and OR/NOR Logic blocks.
3. To study and perform experiment - Digital to analog and analog to digital converters.
4. To study and perform experiment - Various types of counters and shift registers.
5. To study and perform experiment - Interfacing of CMOS to TTL and TTL to CMOS ICs.
6. To study and perform experiment- BCD to binary conversion on digital IC trainer.
7. To study and perform experiment -
 - (a) Astable (b) Monostable (c) Bistable Multivibrators and the frequency variation with different parameters, observe voltage waveforms at different points of transistor.
8. To study and perform experiment -Voltage comparator circuit using IC-710.
9. To study and perform experiment- Schmitt transistor binary circuit.
10. Design 2 bit binary up/down binary counter on bread board.

BCSAI 207: COMPUTER AIDED GRAPHICS & DRAFTING LAB

0L + 0T + 4P + 2C

MM 100

Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules of dimensioning, Computer aided drafting: Introduction to computer aided drafting, advantages and applications of CAD, concepts of computer aided drafting using AutoCAD, basic drawing and modify commands.
[Discussion on AutoCAD software and drawing in Sketch book]

Isometric Projections: Isometric projection of planes and solids.
[At least 3 Problems in AutoCAD and 3 problems in Sketch book]

Orthographic Projection: Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection.
[At LEAST 4 problems on AutoCAD and 4problems in sketch book]

Section of solids: Introduction to sectional views, Section of right solids by normal and inclined planes.
[At least 2 problems on AutoCAD and 2problems in sketch book]

Conventional representation of materials: Common features, Springs, Gear Assemblies, Materials, Interrupted views and Braking of Shaft, Pipe, Bar, Surface finishing & Machining Symbols
[At least 2 problems on AutoCAD and 2 problems in sketch book]

Miscellaneous: Welded joints, riveted joints, Belt and pulleys, screw fasteners, Bearings; Ball, roller, needle, foot step bearing Belt and pulleys, pipe joints.
[At least one problem from each on AutoCAD and sketch book preparation of all topics]

Text/Reference Books

1. N.D. Bhatt, Elementary Engg. Drawing, Chartor Pub. House, Anand, India.
2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd..
3. P.S. Gill, Engineering Graphics.
4. N.D. Bhatt, Machine Drawing, Chartor Publishing house, Anand, India.
5. Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.
6. Fredderock E. Giesecke, Alva Mitchell & others, Principles of Engineering Graphics, Maxwell McMillan Publishing.

Semester II

B. Tech CSE (AI)

ENG 114: BUSINESS AND TECHNICAL COMMUNICATION LAB

0L + 0T + 4P + 2C

MM 100

1. Phonetic Symbols and Transcriptions
2. Methods of Word Formation
3. Reading, Listening and Speaking Skills
4. Seminar Presentation
5. Group Discussion
6. Job Interview

Text / Reference Books

1. Advanced Manual for Communication Laboratories and Technical Report Writing, D.Sudha Rani, Pearson,(New Delhi)
2. A Course in Phonetics and Spoken English, J. Sethi & P.V. Dhamija, PHI Learning Pvt. Ltd.
3. English Language Laboratories: A Comprehensive Manual, Nira Konar, PHI Learning Pvt. Ltd.
4. Oxford English Learning Package (with CDs: Headway Series)
5. Tata McGraw Hills English Learning Package (with CDs)
6. Oxford Advanced Learners' Dictionary, Oxford University Press (New Delhi)