FACULTY OF ENGINEERING & TECHNOLOGY

COMPUTER SCIENCE & ENGINEERING
with **Specialization using AI & ML**

Curriculum Structure

(Second Year- III Semester)

[Effective from Session 2020-21]

1

STUDY & EVALUATION SCHEME

B.Tech. (CSE specialization with AI&ML)

II Year: III Semester

S.No.	Subject code	Subject name	L	T	P	Sessional Assessment			SEE	Subject Total	Credit
						MST	TA	Total			
THEORY SUBJECT											
1	ACS301	Soft Computing	3	1	0	15	15	30	70	100	4
2	ACS302	Web Technology	3	0	0	15	15	30	70	100	3
3	ACS303	Data Structures	3	1	0	15	15	30	70	100	4
4	EC301	Digital Logic Design	3	0	0	15	15	30	70	100	3
5	AS302	Industrial Sociology	2	0	0	15	15	30	70	100	2
6	ACS304	Engineering Mathematics-III	3	1	0	15	15	30	70	100	4
7	GP301	General Proficiency	-	-	-	-	-	50	0	50	0
PRACTICAL/DESIGN/DRAWING											
7	ACS351	Soft Computing Lab	0	0	2	15	15	30	70	100	1
8	ACS352	Web Technology Lab	0	0	2	15	15	30	70	100	1
9	ACS 353	Data Structures Lab	0	0	2	15	15	30	70	100	1
10	EC351	Digital Electronics Lab	0	0	2	15	15	30	70	100	1
		Total	17	3	8					1000	24

L- Lecture
T -Tutorial
P-Practical
MST- Mid Semester Test
TA-Teacher's Assessment
SEE- Semester End Examination

SOFT COMPUTING
(ACS301)

Unit	Topic
I	**Neural Networks-1(Introduction & Architecture):** Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks.Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.
II	**Neural Networks-II (Back propogation networks):** Architecture perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propogation algorithm, factors affecting backpropagation training, applications.
III	**Fuzzy Logic-I (Introduction)** Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.
IV	**Fuzzy Logic –II (Fuzzy Membership, Rules)**: Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.
V	**Genetic Algorithm(GA)** Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

Text Book (s):

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.
2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press.
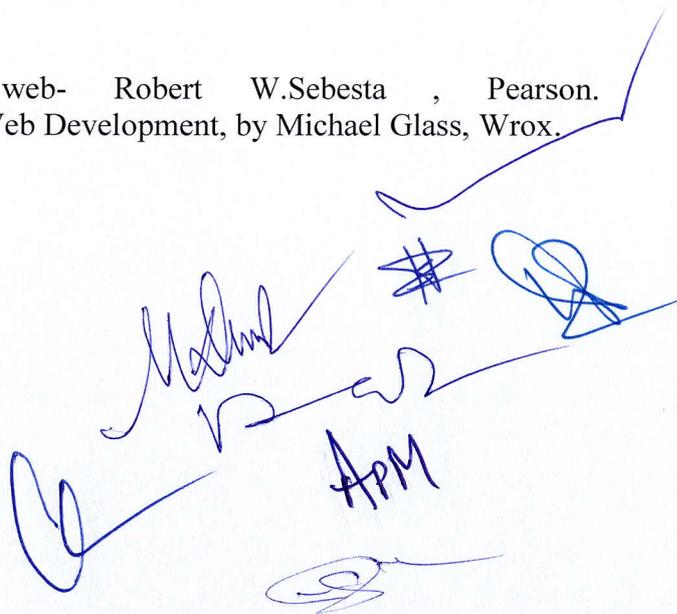Reference Books:
3. Siman Haykin,"Neural Netowrks"Prentice Hall of India
4. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.
5. Kumar Satish, "Neural Networks" Tata Mc Graw Hill

WEB TECHNOLOGY
(ACS302)

Unit	Topic
I	**Introduction to Web Technology:** Internet, WWW, Web Browsers with suitable examples , Web Servers with suitable examples, URL, HTTP, MIME. Introduction to HTML& DHTML : Basic Syntax, HTML Document Structure , Text Formatting, Images, Lists, Links, Tables, Frames, Forms. Cascade Style Sheets : Levels Of Style Sheets, Specification Formats, Style Classes , Properties, Colors, Span and Div tags.
II	**Introduction to Java Script:** Overview of java Script, Syntactic characteristics, Primitives, Operator and Expression, control statements, Arrays, functions, errors in scripts, Document Object Model(DOM),Event driven computation, element access in Java script, The navigator Object. Dynamic Document with Java Script : Element positioning, Moving elements, Changing colors and fonts, Dynamic content, Locating the mouse Cursor, Slow movements of elements, Dragging and Dropping Elements.
III	**Introduction to XML:** Syntax of XML, Document Structure, Document type definition, Namespaces,XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX.
IV	**Introduction to PHP:** Overview of PHP, general server characteristics, Creating PHP Pages, Form handling , Data Base access with PHP & MySql. JSP & Servlets: Basics of JSP, Tags, Session Handling, Redirection and Basics of Servlet
V	**Database Connectivity:** Connection to various databases (MySQL, Oracle). Database connectivity in PHP, JSP, Other server languages, Basic SQL Queries and Statements.

Text Book (s):
1. Programming world wide web- Robert W.Sebesta , Pearson.
2. Beginners PHP, Apache, MY Sql, Web Development, by Michael Glass, Wrox.

DATA STRUCTURES
(ACS303)

Unit	Topic
I	**Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. **Searching:** Linear Search and Binary Search Techniques and their complexity analysis.
II	**Stacks and Queues**: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.
III	**Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.
IV	**Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.
V	**Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing. **Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Text Book (s):

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
2. "Data Structures", RS Salaria, Khanna Publishing House
3. How to Solve it by Computer", 2nd Impression by R.G. Dromey, Pearson Education.

DIGITAL LOGIC DESIGN
EC301

UNIT I Digital Design and Binary Numbers: Binary Arithmetic, Negative Numbers and their Arithmetic, Floating point representation, Binary Codes, Cyclic Codes, Error Detecting and Correcting Codes, Hamming Codes. Minterm and Maxterm Realization of Boolean Functions, Gate-level minimization: The map method up to four variable, don't care conditions, SOP and POS simplification, NAND and NOR implementation, Quine McCluskey Method (Tabular method)
UNIT II Combinational Logic: Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Code Converters, Parity Generators and Checkers, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders,Encoders, Multiplexers, Hazards and Threshold Logic
UNIT III Synchronous Sequential Logic: Sequential Circuits, Storage Elements: Latches, Flip Flops, Analysis of Clocked Sequential circuits, state reduction and assignments, design procedure. Registers and Counters: Shift Registers, Ripple Counter, Synchronous Counter, Other Counters.
UNIT IV Asynchronous Sequential Logic: Analysis procedure, circuit with latches, design procedure, reduction of state and flow table, race free state assignment, hazards.
UNIT V Memory and Programmable Logic Devices: Semiconductor Memories, RAM, ROM, PLA, PAL, Memory System design.

Text Books:
1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education.
2. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press.
3. RP Jain, "Modern Digital Electronics", Tata McGraw Hill Publication.

Reference Books:
1. DP Kothari and J.S. Dhillon, "Digital Circuits and Design", Pearson Education.
2. A. Anand Kumar, "Fundamentals of Digital Circuits", PHI Learning Pvt. Ltd.

AS 301/AS 401: MATHEMATICS-III

UNIT–I:

Laplace Transform : Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear and simultaneous differential equations.

UNIT–II:

Statistical Techniques: Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves, Correlation, Linear, non–linear and multiple regression analysis, Binomial, Poisson and Normal distributions, Tests of significations: Chi-square test, t-test.

UNIT–III:

Numerical Techniques–I : Zeroes of transcendental and polynomial equations using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods. Interpolation: Finite differences, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals.

UNIT–IV:

Numerical Techniques–II: Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss- Seidel method. Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson's one third and three-eight rules, Solution of ordinary differential equations (first order, second order and simultaneous) by Euler's, Picard's and fourth-order Runge- Kutta methods.

UNIT–V:

Integral Transforms: Fourier integral, Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations, wave equations and Laplace equations, Z-transform and its application to solve difference equations.

Test Books:
1. Peter V. O'Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.
2. Jain, Iyenger & Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi.
3. JN Kapur, Mathematical Statistics, S. Chand & company Ltd.
4. BS Grewal, Higher Engineering Mathematics, Khanna Publishers.

Reference Books:

1. RK Jain & SRK Iyenger, Advance Engineering Mathematics, Narosa Publication House.
2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
3. S. S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Pvt. Limited, New Delhi
4. E. Balagurusamy, Numerical Methods, Tata McGraw-Hill Publishing Company Limited, New Delhi
5. T. Veerajan& T. Ramchandrandran, Theory & Problems in Numerical Methods, TMH, New Delhi.

SOFT COMPUTING LAB
(ACS351)

LIST OF EXPERIMENTS

1. Create a perceptron with appropriate no. of inputs and outputs. Train it using fixed increment learning algorithm until no change in weights is required. Output the final weights.

2. Create a simple ADALINE network with appropriate no. of input and output nodes. Train it using delta learning rule until no change in weights is required. Output the final weights.

3. Train the autocorrelator by given patterns: A1=(-1,1,-1,1), A2=(1,1,1,-1), A3=(-1, -1, - 1, 1). Test it using patterns: Ax=(-1,1,-1,1), Ay=(1,1,1,1), Az=(-1,-1,-1,-1).

4. Train the hetrocorrelator using multiple training encoding strategy for given patterns: A1=(000111001) B1=(010000111), A2=(111001110) B2=(100000001), A3=(110110101) B3(101001010). Test it using pattern A2

5. Implement Union, Intersection, Complement and Difference operations on fuzzy sets. Also create fuzzy relation by Cartesian product of any two fuzzy sets and perform maxmin composition on any two fuzzy relations.

6. Solve Greg Viot's fuzzy cruise controller using MATLAB Fuzzy logic toolbox.

7. Solve Air Conditioner Controller using MATLAB Fuzzy logic toolbox.

8. Implement TSP using GA.

WEB TECHNOLOGY LAB
(ACS352)

LIST OF EXPERIMENTS

1. Write a program in HTML to display different styles of heading text.
2. Write a program to display the processes to be followed for a patient when he enters for a complete check-up. Use ordered lists and unordered lists.
3. Write a program to display a traditional Newspaper with the use of table tags.
4. With the help of "IMAGE" tags write a program to display the image along with some contents.
5. Use "Anchor" tag to write a program for displaying various Menus.
6. Use mapping technique, to map a particular part of image and move the control corresponding to that area. For e.g., in an image, if there are bat, ball, stump etc. When you click stump control should move to a file call St.htm.
7. Create frames that have details about various cities.
8. Create a form to display the kinds of food available in a Restaurant. (Use checkboxes wherever necessary)
9. Write a program to "reload" a page automatically once in 5 seconds.
10. Write a program using CSS to set the background colour, font, and paragraph.

DATA STRUCTURE USING C LAB
(ACS353)

LIST OF EXPERIMENTS

1. Sorting Algorithms-Non-Recursive.
2. Sorting Algorithms-Recursive.
3. Searching Algorithm.
4. Implementation of Stack using Array.
5. Implementation of Queue using Array.
6. Implementation of Circular Queue using Array.
7. Implementation of Stack using Linked List.
8. Implementation of Queue using Linked List.
9. Implementation of Circular Queue using Linked List.
10. Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion in BST.
11. Graph Implementation, BFS, DFS, Minimum cost spanning tree, shortest path algorithm.

DIGITAL ELECTRONICS LAB
(EC351)

SR. NO	NAMEOFEXPERIMENT
1	Introduction to Digital Electronics lab-nomenclature of digital ICS , specifications ,study of the datasheet , concept of vcc and ground, verification of the truth tables of logic gates using TTL ICS.
2	Implementation of the given Boolean function using logic gates in both sop and pos forms.
3	To Study the Half Adder
4	To study about full adder & verify its observation data.
5	To Design & Verify the Operation of Magnitude Comparator
6	Implementation of 4x1 Multiplexer and 1x4 Demultiplexer using Logic Gates
7	Verification of State Tables of RS ,J-k ,T and D Flip-Flops using NAND Gates
8	Design, and Verify the 4-Bit Serial In - Parallel Out Shift Registers.
9	Design ,and Verify the 4-Bit Synchronous Counter
10	Design, and Verify the 4-Bit Asynchronous Counter.

خواجہ معین الدین چشتی اردو، عربی-فارسی یونیورسٹی، لکھنؤ، اتر پردیش، انڈیا

ख़्वाजा मुईनुद्दीन चिश्ती उर्दू, अरबी-फ़ारसी विश्वविद्यालय, लखनऊ, उत्तर प्रदेश, भारत

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U.P. STATE GOVERNMENT UNIVERSITY

(Recognised U/S 2(f) & 12 (B) of the UGC Act 1956 & B.Tech. approved by AICTE)

FACULTY OF ENGINEERING & TECHNOLOGY

COMPUTER SCIENCE & ENGINEERING
with Specialization using AI & ML

Curriculum Structure

(Second Year- IV Semester)

[Effective from Session 2020-21]

2

STUDY & EVALUATION SCHEME

B.Tech. (CSE specialization with AI&ML)

II Year: IV Semester

S.No.	Subject code	Subject name	L	T	P	Sessional			SEE	Subject Total	Credit
						MST	TA	Total			
THEORY SUBJECT											
1	ACS401	Operating System	3	1	0	15	15	30	70	100	4
2	ACS402	Artificial Intelligence	3	1	0	15	15	30	70	100	4
3	ACS403	Database Management System	3	1	0	15	15	30	70	100	4
4	ACS404	Computer Organisation & Architecture	3	1	0	15	15	30	70	100	4
5	ACS405	Discrete Matheatics	3	1	0	15	15	30	70	100	4
6	HM401	Effective Techanical Communication	2	0	0	15	15	30	70	100	0
7	GP401	General Proficiency	-	-	-	-	-	50	0	50	0
PRACTICAL/DESIGN/DRAWING											
7	ACS451	Operating System Lab	0	0	2	15	15	30	70	100	1
8	ACS452	Artificial Intelligence Lab	0	0	2	15	15	30	70	100	1
9	ACS453	Database Management System Lab	0	0	2	15	15	30	70	100	1
10	ACS 454	Computer Organisation & Architecture	0	0	2	15	15	30	70	100	1
11	HS351	Communication Skill Lab	0	0	2	0	0	50	0	50	0
		Total	17	5	8					1000	24

L- Lecture

T -Tutorial

P-Practical

MST- Mid Semester Test

TA-Teacher's Assessment

SEE- Semester End Examination

OPERATING SYSTEM
(ACS401)

Objective: To give knowledge about principles of modern operating system.	
Unit	**Topic**
I	**Introduction to Operating Systems:** Role and purpose of operating systems, Operating System Services, Classification of Operating systems, Operating System Structure, System Calls.
II	**CPU Scheduling:** Process vs. Program, Process States, Process Transition Diagram, Process Control Block, Process Address Space, Schedulers, Scheduling Concepts, Performance Criteria, Scheduling Algorithms, Threads, Deadlock Problem, Deadlock Characterization, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Methods for Deadlock Handling.
III	**Inter-process Communication:** Race conditions, Critical sections, Mutual exclusion, Critical-section problem, Algorithmic approach to implementing critical sections, Hardware support for process synchronization, Semaphores, Mutexes, Monitors. **Classic Problems of Synchronization:** Producers-consumers with bounded buffers problem, Readers-writers problem, Dining-philosophers problem
IV	**Memory Management:** Introduction, Logical and Physical Address Space, Swapping, Contiguous Memory Allocation, Fragmentation, Paging, Structure of Page Table, Segmentation, Segmentation with Paging. Virtual Memory: Demand Paging, Performance of Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing
V	**File system:** File Concept, Access Methods, Directories, Mounting of File-System, File-System Structure, File-System Implementation, Allocation Methods. I/O Devices, and I/O Subsystems, I/O Buffering, Disk Storage and Disk Scheduling, Disk Management, RAID.

Text Book (s) :

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, John Wiley.
2. William Stallings, Operating Systems: Internals and Design Principles. PHI,
3. Dhananjay M. Dhamdhere, "Operating Systems A Concept-Based Approach", TMH
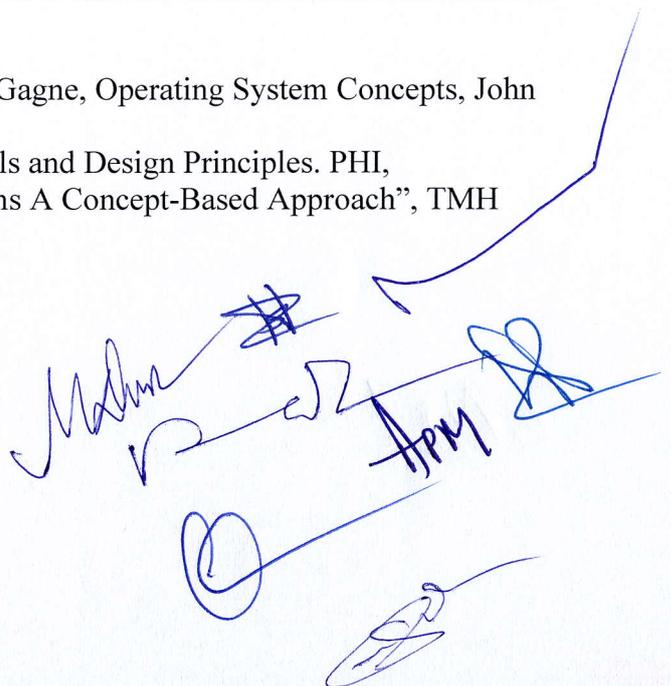
ARTIFICIAL INTELLIGENCE
(ACS402)

Unit	Topic
Objective: To learn the concepts of Artificial Intelligence and the methods of solving problems using Artificial Intelligence.
I	**Introduction:** Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents, Computer vision, Natural Language Possessing.
II	**Introduction to Search**: Searching for solutions, Uniformed search strategies, Informed search Strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.
III	**Knowledge Representation & Reasoning:** Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.
IV	**Machine Learning :** Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data - EM algorithm, Reinforcement learning,
V	**Pattern Recognition :** Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule,Bayes Classifier, Support Vector Machine (SVM), K –means clustering.

References:
1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", McGraw Hill, 2008.
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
3. Peter Jackson, "Introduction to Expert Systems", Pearson Education, 2011.

DATABASE MANAGEMENT SYSTEM
(ACS403)

Unit	Topic
I	**Database system architecture:** Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). **Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.
II	**Relational query languages:** Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. **Relational database design:** Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. **Query processing and optimization:** Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.
III	**Storage strategies**: Indices, B-trees, hashing. **Transaction processing:** Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.
IV	**Database Security:** Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.
V	**Advanced topics:** Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Text Book (s):

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

2. *"Principles of Database and Knowledge – Base Systems"*, Vol 1 by J. D. Ullman, Computer Science Press.

3. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education

4. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

COMPUTER ORGANIZATION &ARCHITECTURE
(ACS404)

Unit	Topic
I	**Functional blocks of a computer**: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU–registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs. **Data representation**: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.
II	**Introduction** to x86 architecture. **CPU control unit design**: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU. **Memory system design**: semiconductor memory technologies, memory organization.
III	**Peripheral devices and their characteristics**: Input-output subsystems, I/O device interface, I/O transfers–program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes–role of interrupts in process state transitions, I/O device interfaces – SCII, USB
IV	**Pipelining**: Basic concepts of pipelining, throughput and speedup, pipeline hazards. **Parallel Processors**: Introduction to parallel processors, Concurrent access to memory and cache coherency.
V	**Memory organization:** Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Text Book (s):
1. "Computer Organization & Architecture", Rajaraman, PHI Learning
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

DISCRETE MATHMATICS
(ACS405)

Unit	Topic
I	**Sets, relations and functions:** Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses.
II	**Propositional Logic:** Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory. **Partially ordered sets:** Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices. Boolean and pseudo Boolean lattices.
III	**Algebraic Structures:** Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations- ring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only).
IV	**Introduction to Counting:** Basic counting techniques – inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions.
V	**Introduction to Graphs:** Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.

Text Book (s):

1. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill.
2. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific.
3. T. Veerarajan, "Discrete Mathematics", Tata McGraw-Hill
4. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill.
5. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Ed., Jones and Bartlett.

COMMUNICATION SKILLS
(HS-301)

UNIT I
Introduction to Communication: Need for effective communication, Functions of Communication and Induction to the students
The Fundamentals of Communication: Communication Cycle, Levels of communication; Flow of communication; Communication networks; General and Technical Communication.
UNIT II
Barriers to Effective Communication: Miscommunication; Noise; Types of barriers; Communication across Culture, case Studies and Overcoming measures.
Non-verbal Communication and Body Language: Forms of Non-verbal communication; Kinesics; Proxemics; Chronemics and Effective use of body language.
Grammar and Vocabulary: Tenses, Determiners, prepositions, conjunctions, Model Auxiliaries, concord, active and passive voice, Homonyms, Homophones, Acronyms (general abbreviations).
UNIT III
Presentation Skills: 4Ps (Planning, Preparation, Practice, Presentation), Outlining; Effective use of A/V aids and Modes of Delivery
Listening Skills: Hearing Vs listening, process of listening, types, Barriers to Listening, Qualities of a Good Listener and Active Vs Passive Listening
Telephone Skills : Telephonic Communication: Do's and Don'ts
UNIT IV
Speaking Skills: Introducing yourself, Describing a person, place, situation and event, Giving instruction, Making inquiries – at a bank, post-office, air-port, hospital, reservation counter and role play
Writing Skills: Basics of Writing, Paragraph Writing, Precise Writing, Memos, Advertisements, Paraphrasing and Summarizing
Study Skills: Taking/making notes from reference Materials, Comprehending and Describing- Graphs and charts
UNIT V
Letter Writing: Informal Letter,(Formal)Business Letters: Essential and Occasional Parts of a letter, layout, Characteristic and Letter of Inquiry, Complaint and Adjustments, orders and replies of it
Report Writing: Format ,Structure and Types, Technical Reports, Description and Proposal
Reading Skills: Skimming and Scanning, Intensive and Extensive Reading, Poor habits of reading and The SQ3R Method
Computer Assisted Language Learning: Effective e-mail messages and power-point presentation

Text Books/ Reference Books:
1. Muralikrishna C., Sunita Mishra "Communication Skills for Engineers" 2nd edition, Pearson, New Delhi 2010
2. Vyas Manish A., Yogesh L. Patel, "Tasks for the English Classroom", MacMillan, New Delhi, 2012.
3. Achar Deeptha, Charul Jian and et al, English for Academic Purposes,Book-1&2 University Granthnirman Board, Gujarat, 2011
4. Michael vince, 'Advanced Language Practice', Macmillan Education, oxford,2003
5. Eisenbach Iris, "English for Materials Science and Engineering", Springer Fachmedien Wiesbaden GmbH 2011
6. Lougheed Lin, "Business Correspondence: A Guide to Everyday Writing', Longman, Pearson Education, Inc,2003

OPERATING SYSTEM LAB
(ACS451)

LIST OF EXPERIMENTS

1. Implement CPU Scheduling Policies:

i. SJF   ii. Priority   iii. FCFS   iv. Multi-level Queue

2. Implement file storage allocation technique:

i. Contiguous(using array)

ii. Linked –list(using linked-list)

iii. Indirect allocation (indexing)

3. Implementation of contiguous allocation techniques:

i. Worst-Fit   ii. Best- Fit   iii. First- Fit

4. Calculation of external and internal fragmentation

i. Free space list of blocks from system   ii. List process file from the system

5. Implementation of compaction for the continually changing memory layout and calculate total movement of data

6. Implementation of resource allocation graph RAG)

7. Implementation of Banker's algorithm

8. Conversion of resource allocation graph (RAG) to wait for graph (WFG) for each type of method used for storing graph.

9. Implement the solution for Bounded Buffer (producer-consumer)problem using inter process communication techniques-Semaphores.

10. Implement the solutions for Readers-Writers problem using inter process communication technique –Semaphore.

ARTIFICIAL INTELLIGENCE LAB
(ACS452)

LIST OF EXPERIMENTS

1. WAP in Prolog to have an introduction of Prolog fundamentals: constants, predicates, arguments, variables.
2. WAP in Prolog to have an introduction of Tests, Backtracking.
3. WAP in Prolog to have an introduction of Recursion.
4. WAP in Prolog to have an introduction of State-Space Search: DFS
5. WAP in Prolog to have an introduction of State-Space Search: BFS
6. Write a program to implement supervised learning on IRIS Dataset using Bayes classifier.
7-8. Write a program to implement Genetic Algorithm to find out the optimal solution of different equation.
9. Write a program to implement Nearest Neighbour classification technique.
10. Write a program to implement k-means clustering on IRIS Dataset.

DATABASE MANAGEMENT SYSTEM LAB
(ACS453)

LIST OF EXPERIMENTS

1. Write the queries for Data Definition and Data Manipulation Language.

2. Write SQL queries using logical operators.

3. Write SQL queries using SQL operators

4. Write SQL query using character, number, date and group functions

5. Write SQL queries for relational algebra

6. Write SQL queries for extracting data from more than one table

7. Write SQL queries for sub queries, nested queries

8. Write program of PL/SQL

9. Concepts for ROLL BACK, COMMIT & CHECK POINTS

10. Create VIEWS, CURSORS and TRGGERS.

COMPUTER ORGANIZATION &ARCHITECTURE LAB
(ACS454)

1. Implementing HALF ADDER, FULL ADDER using basic logic gates

2. Implementing Binary -to -Gray, Gray -to -Binary code conversions.

3. Implementing 3-8 line DECODER.

4. Implementing 4x1 and 8x1 MULTIPLEXERS.

5. Verify the excitation tables of various FLIP-FLOPS.

6. Design of an 8-bit Input/ Output system with four 8-bit Internal Registers.

7. Design of an 8-bit ARITHMETIC LOGIC UNIT.

8. Design the data path of a computer from its register transfer language description.

9. Design the control unit of a computer using either hardwiring or microprogramming based on its register transfer language description.

10. Implement a simple instruction set computer with a control unit and a data path.

COMMUNICATION SKILLS LAB
HS-351

Sr. no.	List of experiments
1	Competency Test: Computer based Test
2	Interpersonal Communication: Ice breakers, Jumble story
3	Listening Skill: Practice
4	Reading Skill: Practice and Test
5	Functional Grammar Practice and Test
6	Speaking Practice: Role Play and Communicative Activities
7	Letter writing: Practice and Test
8	Technical Report writing
9	E-mail Writing
10	Presentation Practice