NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY UTTAR PRADESH, LUCKNOW

Evaluation Scheme & Syllabus

For

Bachelor of Technology

Computer Science And Business System

Third Year

(Effective from the Session: 2022-23)

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Bachelor of Technology
Computer Science And Business System
EVALUATION SCHEME
SEMESTER-V

Sl. No.	Subject Codes	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
WEEKS COMPULSORY INDUCTION PROGRAM													
1	ACSBS0501	Design and Analysis of Algorithms	3	0	0	30	20	50		100		150	3
2	ACSBS0502	Compiler Design	3	0	0	30	20	50		100		150	3
3	ACSBS0503	Design Thinking	2	0	0	30	20	50		50		100	2
4	ACSBS0504	Business Strategy	2	0	0	30	20	50		50		100	2
5	ACSBS0505	Fundamentals of Management	2	0	0	30	20	50		50		100	2
6		Departmental Elective -I	3	0	0	30	20	50		100		150	3
7		Departmental Elective -II	2	1	0	30	20	50		100		150	3
8	ACSBS0551	Design and Analysis of Algorithms Lab	0	0	2				25		25	50	1
9	ACSBS0552	Compiler Design Lab	0	0	2				25		25	50	1
10		Departmental Elective -I Lab	0	0	2				25		25	50	1
11	ACSBS0558	Mini Project	0	0	2				50			50	1
12		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										**1100**	**22**

List of MOOCs (Coursera) Based Recommended Courses for Third Year (Semester-V) B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0079	Human-Centered Design for Inclusive Innovation	University of Toronto	13	1
2	AMC0082	Introduction of Business analytics with R	University of Illionois	17	1

PLEASE NOTE: -

- **Internship (3-4 weeks) shall be conducted during summer break after semester-IV and will be assessed during semester-V**
- **Compulsory Audit Course(Non-Credit)**
  - All Compulsory Audit Courses (a qualifying exam) has no credit.
  - Total and obtained marks are not added in the Grand Total.

Abbreviation Used: -

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional,
TE: Theory End Semester Exam., PE: Practical End Semester Exam.

List of Departmental Electives

Sl. No.	Departmental Electives	Subject Codes	Subject Name	Branch	Semester
1	Elective-I	ACSBS0511	Conversational Systems	CSBS	5
2	Elective-I	ACSBS0512	Cloud, Microservices & Application	CSBS	5
3	Elective-I	ACSBS0513	Machine Learning	CSBS	5
4	Elective-II	ACSBS0514	Behavioral Economics	CSBS	5
5	Elective-II	ACSBS0515	Computational Finance & Modeling	CSBS	5
6	Elective-II	ACSBS0516	Industrial Psychology	CSBS	5

List of Departmental Electives Lab

Sl. No.	Departmental Electives	Subject Codes	Subject Name	Branch	Semester
1	Elective-I	ACSBS0511P	Conversational Systems Lab	CSBS	5
2	Elective-I	ACSBS0512P	Cloud, Microservices & Application Lab	CSBS	5
3	Elective-I	ACSBS0513P	Machine Learning Lab	CSBS	5

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Bachelor of Technology
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EVALUATION SCHEME
SEMESTER-VI

Sl. No.	Subject Codes	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	ACSBS0601	Artificial Intelligence	3	0	0	30	20	50		100		150	3
2	ACSBS0602	Computer Networks	3	0	0	30	20	50		100		150	3
3	ACSBS0603	Information Security	3	0	0	30	20	50		100		150	3
4	ACSBS0604	Business Communication & Value Science-IV	2	1	0	30	20	50		100		150	3
5	ACSBS0605	Financial & Cost Accounting	2	0	0	30	20	50		50		100	2
6		Departmental Elective -III	3	0	0	30	20	50		100		150	3
7		Departmental Elective -IV	3	0	0	30	20	50		100		150	3
8	ACSBS0651	Artificial Intelligence Lab	0	0	2				25		25	50	1
9	ACSBS0652	Computer Networks Lab	0	0	2				25		25	50	1
10	ACSBS0653	Information Security Lab	0	0	2				25		25	50	1
11		Departmental Elective-III Lab	0	0	2				25		25	50	1
12		Departmental Elective-IV Lab	0	0	2				25		25	50	1
		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										**1250**	**25**

List of MOOCs (Coursera) Based Recommended Courses for Third Year (Semester-VI) B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0117	Introduction to Data Analytics	Meta marketing	36	3
2	AMC0120	Marketing Analytics Foundation	Meta marketing	12	0.5

OR

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0114	Exploratory Data Analysis with Machine Learning	IBM	14	1
2	AMC0127	Supervised Machine Learning: Regression	IBM	11	0.5

PLEASE NOTE:-

- **Internship (3-4 weeks) shall be conducted during summer break after semester-VI and will be assessed during semester-VII.**
- **Compulsory Audit Courses (Non Credit)**
  - All Compulsory Audit Courses (a qualifying exam) has no credit.
  - Total and obtained marks are not added in the Grand Total.

Abbreviation Used: -

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

Sl. No.	Departmental Electives	Subject Codes	Subject Name	Branch	Semester
1	Elective-III	ACSBS0611	Robotics and Embedded Systems	CSBS	6
2	Elective-III	ACSBS0612	Modern Web Applications	CSBS	6
3	Elective-III	ACSBS0613	Data Mining and Analytics	CSBS	6
4	Elective-IV	ACSBS0614	Enterprise Systems	CSBS	6
5	Elective-IV	ACSBS0615	Advance Finance	CSBS	6
6	Elective-IV	ACSBS0616	Image Processing and Pattern Recognition	CSBS	6

Sl. No.	Departmental Electives	Subject Codes	Subject Name	Branch	Semester
1	Elective-III	ACSBS0611P	Robotics and Embedded Systems Lab	CSBS	6
2	Elective-III	ACSBS0612P	Modern Web Applications Lab	CSBS	6
3	Elective-III	ACSBS0613P	Data Mining and Analytics Lab	CSBS	6
4	Elective-IV	ACSBS0614P	Enterprise Systems Lab	CSBS	6
5	Elective-IV	ACSBS0615P	Advance Finance Lab	CSBS	6
6	Elective-IV	ACSBS0616P	Image Processing and Pattern Recognition Lab	CSBS	6

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AICTE Guidelines in Model Curriculum:

A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 Hours =0.5 Credit
2. For 13 to18 =1 Credit
3. For 19 to 24 =1.5 Credit
4. For 25 to 30 =2 Credit
5. For 31 to 35 =2.5 Credit
6. For 36 to 41 =3 Credit
7. For 42 to 47 =3.5 Credit
8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honours Degree as per following criterion.

i. If he / she secures 7.50 as above CGPA.
ii. Passed each subject of that degree program in the single attempt without any grace.
iii. Successful completion of MOOCs based 20 credits.

B. TECH. THIRD YEAR

Course code	ACSBS0501	L T P	Credits
Course title	DESIGN AND ANALYSIS OF ALGORITHMS	3 0 0	3

Course objective:

The objective of this course is to understand the fundamental concepts of the basics of computational complexity analysis and various algorithm design paradigms. The goal is to provide students with solid foundations to deal with a wide variety of computational problems, and to provide a thorough knowledge of the most common algorithms and data structures.

Pre-requisites: Basic Knowledge of Design and Analysis of Algorithms

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO DESIGN AND ANALYSIS OF ALGORITHM	8 Hours

Introduction: Characteristics of Algorithm. Analysis of Algorithm: Asymptotic analysis of Complexity Bounds – Best, Average and Worst-Case behavior; Performance Measurements of Algorithm, Time and Space Trade-Offs, Analysis of Recursive Algorithms through Recurrence Relations: Substitution Method, Recursion Tree Method and Masters' Theorem.

UNIT-II	FUNDAMENTAL ALGORITHMIC STRATEGIES	8 Hours

Fundamental Algorithmic Strategies: Brute-Force, Heuristics, Greedy, Dynamic Programming, Branch and Bound and Backtracking methodologies; Illustrations of these techniques for Problem-Solving, Bin Packing, Knapsack, Travelling Salesman Problem.

UNIT-III	GRAPH AND TREE ALGORITHMS	8 Hours

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

UNIT-IV	TRACTABLE AND INTRACTABLE PROBLEM	8 Hours

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

UNIT-V	ADVANCE ALGORITHMS	8 Hours

Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE, Introduction to Quantum Algorithms.

Course outcome: After completion of this course students will be able to:

CO 1	Understand the fundamental concepts of Design and Analysis of Algorithm	K3
CO 2	Explain and exemplify the most common algorithms and their strategies	K2

CO 3	Study different type of Graph and Tree	K3
CO4	Analyze how to trace and intractable problem	K4
CO 5	Illustrate advance algorithms	K3

Text books:

1) *Fundamental of Computer Algorithms*, E. Horowitz and S. Sahni. https://kailash392.files.wordpress.com/2019/02/fundamentalsof-computer-algorithms-by-ellis-horowitz.pdf

2) *The Design and Analysis of Computer Algorithms*, A. Aho, J. Hopcroft and J. Ullman. https://doc.lagout.org/science/0_Computer%20Science/2_Algorithms/The%20Design%20and%20Analysis%20of%20Computer%20Algorithms%20%5BAho,%20Hopcroft%20&%20Ullman%201974-01-11%5D.pdf

Reference Books:

1) *Introduction to Algorithms*, T. H. Cormen, C. E. Leiserson and R. L. Rivest.

2) *Computer Algorithms: Introduction to Design and Analysis*, S. Baase.

3) *The Art of Computer Programming, Vol. 1, Vol. 2 and Vol. 3*, .D. E. Knuth.

Links:

Unit 1	https://www.youtube.com/watch?v=eIw9hePi4A0 https://www.youtube.com/watch?v=7dz8Iaf_weM&list=PLxCzCOWd7aiHcmS4i14bI0VrMbZTUvlTa&index=3 https://www.youtube.com/watch?v=OLttwv_4Ltw&list=PLxCzCOWd7aiHcmS4i14bI0VrMbZTUvlTa&index=4
Unit 2	https://www.youtube.com/watch?v=DKCbsiDBN6c https://www.youtube.com/watch?v=Pu_hqOXSV38
Unit 3	https://www.youtube.com/watch?v=pcKY4hjDrxk https://www.youtube.com/watch?v=I_JuQ5ayPmc&t=520s
Unit 4	https://www.youtube.com/watch?v=26zyR6NevdY https://www.youtube.com/watch?v=NQaJayrB71s
Unit 5	https://www.youtube.com/watch?v=iug_d-PxLio https://www.youtube.com/watch?v=e2cF8a5aAhE

B. TECH. THIRD YEAR

Course code	ACSBS0502	L T P	Credits
Course title	COMPILER DESIGN	3 0 0	3

Course objective:

The objective of this course is to understand the fundamental concepts of Compiler, in this course is to explore the principles, algorithms, and data structures involved in the design and construction of compiler. Topics included context-free grammars, lexical analysis, parsing techniques, symbol tables, error recovery, code generation, and code optimization.

Pre-requisites: Basic Knowledge of compiler

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO COMPILER	8 Hours

Introduction: Phases of compilation and overview. Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, relating regular expressions and finite automata, scanner generator (lex, flex)

UNIT-II	SYNTAX ANALYSIS (PARSER)	8 Hours

Context-free languages and grammars, push-down automata, LL (1) grammars and top-down parsing, operator grammars, LR(O), SLR (1), LR (1), LALR (1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR (1) parser generator (yacc, bison)

UNIT-III	SEMANTIC ANAYSIS	8 Hours

Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree. **Symbol Table:** Basic structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, scope.

UNIT-IV	CODE GENERATION AND IMPROVEMENT	8 Hours

Intermediate Code Generation: Translation of different language features, different types of intermediate forms.

Code Improvement (optimization): control-flow, data-flow dependence etc.; local optimization, global optimization, loop optimization, peep-hole optimization etc.

UNIT-V	ARCHITECTURE DEPENDENT CODE IMPROVEMENT	8 Hours

Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation.

Advanced topics: Type systems, data abstraction, compilation of Object-Oriented features and non-imperative programming languages.

Course outcome: After completion of this course students will be able to:

CO 1	Understand and apply the fundamental concepts of compiler design, language, machine, and expressions.	K3
CO 2	Explain in detail the lexical, syntactic and semantic analysis into meaningful phases for a compiler to undertake language translation.	K2
CO 3	Describe semantic analyzer without the aid of automatic generators	K3
CO4	Describe techniques for intermediate code and machine code optimization	K4

CO 5	Describe the Architecture and machine dependent code improvement and the object- oriented features.	K3

Text books:

3) *Compilers: Principles, Techniques and Tools*, V. Aho, R. Sethi and J. Ullman. 2ND Edition http://ce.sharif.edu/courses/94-95/1/ce414-2/resources/root/Text%20Books/Compiler%20Design/Alfred%20V.%20Aho,%20Monica%20S.%20Lam,%20Ravi%20Sethi,%20Jeffrey%20D.%20Ullman-Compilers%20-%20Principles,%20Techniques,%20and%20Tools-Pearson_Addison%20Wesley%20(2006).pdf

4) *Lex & Yacc*, Levine R. John, Tony Mason and Doug Brown https://d1.amobbs.com/bbs_upload782111/files_33/ourdev_584393GCYRF3.pdf

Reference Books:

1) *The Design and Evolution of C++*, Bjarne Stroustrup.

Links:

Unit 1	https://www.youtube.com/watch?v=Qkwj65l_96I
Unit 2	https://www.youtube.com/watch?v=Sveob49iOpA
Unit 3	https://www.youtube.com/watch?v=cC8YRnDGMwI https://www.youtube.com/watch?v=O-iMkZ7FhKU
Unit 4	https://www.youtube.com/watch?v=j-bLeUysUiE https://www.youtube.com/watch?v=O5YlRUYFDA8 https://www.youtube.com/watch?v=AKYuP3vpdlg https://www.youtube.com/watch?v=clb4tnEm8l4
Unit 5	https://www.youtube.com/watch?v=XWT-XEUOViY https://onlinecourses.nptel.ac.in/noc22_cs14/preview https://www.youtube.com/watch?v=-y8OTRJ7Cvo

B. TECH THIRD YEAR

Course Code	ACSBS0503	L T P	Credits
Course Title	DESIGN THINKING	2 0 0	2

Course Objectives: The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Pre-requisites: None

Course Contents / Syllabus

UNIT-I	Introduction: Empathy	8 HOURS

Introduction to design thinking, traditional problem solving versus design thinking, history of design thinking, wicked problems. Innovation and creativity, the role of innovation and creativity in organizations, creativity in teams and their environments, design mindset. Introduction to elements and principles of design, 13 Musical Notes for Design Mindset, Design Approaches across the world Moccasin walk, Empathy tools- Interviews, empathy maps, emotional mapping, immersion and observations, customer journey maps, and brainstorming, Classifying insights after Observations, Classifying Stakeholders, Do's &Don'ts for Brainstorming,

UNIT-II	Define Stage	8 HOURS

Defining the problem statement, Stages in developing problem statement, creating personas, Point of View (POV) statements. Research- identifying drivers, information gathering, target groups, samples, and feedbacks. Creating appropriately complex problem statement, feasibility.

UNIT-III	Ideation	10 HOURS

Idea Generation-basic design directions, Themes of Thinking, Storytelling, inspirations and references, brainstorming, inclusion, sketching and presenting ideas, idea evaluation, double diamond approach, analyze – four W's, 5 why's, "How Might We", Defining the problem using Ice-Cream Sticks, Metaphor & Random Association Technique, Mind-Map, ideation activity games - six thinking hats, million-dollar idea.

UNIT-IV	Prototyping	10 HOURS

Prototyping (Convergence): Prototyping mindset, tools for prototyping – Sketching, paper models, pseudo-codes, physical mockups, Interaction flows, storyboards, acting/role-playingetc, importance of garnering user feedback for revisiting Brainstormed ideas, Refine and narrow down to the best idea, 10-100-1000gm, QBL, Design Tools for Convergence – SWOT Analysis for 1000gm discussion, Napkin Pitch, Minimum Viable Prototype.

UNIT-V	Testing	9 HOURS

A/B Testing, Decision Making Tools and Approaches – Vroom Yetton Matrix, Shift-Left,Up,Right, Value Proposition, Testing of design with people, conducting usability test, testing as hypothesis, testing as empathy, observation and shadowing methods, Guerrilla Interviews, validation workshops, user feedback, record results, enhance, retest, and refine design, Software validation tools, design parameters, alpha &beta testing, Taguchi, defect classification, random sampling. Agile Methodology. Satori

Course outcome: After completion of this course, students will be able to

CO 1	Develop a strong understanding of the design process and apply it in a variety of business settings	K2,K3
CO 2	Formulate specific problem statements of real time issues and generate innovative idea using design tools	K3

CO 3	Generate ideas for solving the problems.	K3,K6
CO 4	Create prototypes out of ideas generated.	K6
CO 5	Test the prototype to finally reach the amicable solution.	K6

Textbooks

1. Arun Jain, UnMukt : Science & Art of Design Thinking, 2020, Polaris
2. Jeanne Liedta, Andrew King and Kevin Benett, Solving Problems with Design Thinking – Ten Stories of What Works,2013,Columbia Business School Publishing

Reference Books

1. Vijay Kumar, 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization, 2013, John Wiley and Sons Inc, New Jersey
2. BP Banerjee, Foundations of Ethics and Management, 2005, Excel Books
3. Gavin Ambrose and Paul Harris, Basics Design 08: Design Thinking, 2010, AVA Publishing SA
4. Roger L. Martin, Design of Business: Why Design Thinking is the Next Competitive Advantage, 2009, Harvard Business Press, Boston MA

B. TECH THIRD YEAR

Course Code	ACSBS0504	L T P	Credits
Course Title	BUSINESS STRATEGY	2 0 0	2

Course Objectives: To learn the fundamental concepts of strategic management to analyze business situations and apply these concepts to solve business problems.

Pre-requisites: Student must have basic understanding of General Management.

Course Contents / Syllabus

UNIT-I	Introduction to Strategic Management	7 HOURS

Importance of Strategic Management, Vision and Objectives, Schools of thought in Strategic Management, Strategy Content, Process and Practice, Fit Concept and Configuration Perspective in Strategic Management.

UNIT-II	Internal Environment of Firm- Recognizing a Firm's Intellectual Assets	8 HOURS

Core Competence as the Root of Competitive Advantage, Sources of Sustained Competitive Advantage, Business Processes and Capabilities-based Approach to Strategy.

UNIT-III	External Environments of Firm- Competitive Strategy	10 HOURS

Five Forces of Industry Attractiveness that Shape Strategy, The concept of Strategic Groups, and Industry Life Cycle, Generic Strategies, and the Value Chain.

UNIT-IV	Corporate Strategy and Growth Strategies	10 HOURS

The Motive for Diversification, Related and Unrelated Diversification, Business Portfolio Analysis, Expansion, Integration and Diversification, Strategic Alliances, Joint Ventures, and Mergers & Acquisitions

UNIT-V	Strategy Implementation: Structure and Systems	9 HOURS

The 7S Framework, Strategic Control and Corporate Governance

Course outcome: After completion of this course, students will be able to

CO 1	To learn the fundamental concepts of strategic management to analyze business situations and apply these concepts to solve business problems	K3,K4
CO 2	To understand the fundamental principles of and interrelationships among business functions such as: R&D, production, marketing, finance, HR and information technology	K2
CO 3	To understand the inter-relationships of business to individuals, other organizations, government and society.	K2
CO 4	To analyze complex, unstructured qualitative and quantitative problems by using appropriate tools.	K4
CO 5	To evaluate strategic issues and to create strategy	K6

Textbooks

1. Robert M. Grant (2012). Contemporary Strategic Management, Blackwell, 7th Edition.

Reference Books

1. M.E. Porter, Competitive Strategy, 1980. M.E. Porter,
2. Competitive Advantage, 1985 Richard Rumelt (2017). Good Strategy Bad Strategy: The Difference and Why It Matters.
3. Competitive strategy: Techniques for Analyzing Industries and Competion. 2008 by M.E. Porter

B. TECH THIRD YEAR

Course Code	ACSBS0505	L T P	Credits
Course Title	FUNDAMENTALS OF MANAGEMENT	2 0 0	2

Course Objectives: This course will teach students the management theories, evolution of management over the years and few basic concepts without going into the details. After studying this course, the students will develop an understanding about how organizations work and find it easier to grasp the intricacies of other management areas such as finance, marketing, strategy etc. which will be taken up in future terms.

Pre-requisites: Student must have basic understanding of General Management.

Course Contents / Syllabus

UNIT-I	Management Theories	8 HOURS

Concept and Foundations of Management, Evolution of Management Thoughts [Pre-Scientific Management Era (before 1880), Classical management Era (1880-1930), Neo-classical Management Era (1930-1950), Modern Management era (1950-on word). Contribution of Management Thinkers: Taylor, Fayol, Elton Mayo etc.

UNIT-II	Functions of Management	8 HOURS

Planning, Organizing, Staffing, Directing, Controlling.

UNIT-III	Organization Behavior	8 HOURS

Introduction, Personality, Perception, Learning and Reinforcement, Motivation, Group Dynamics, Power & Influence, Work Stress and Stress Management, Decision Making, Problems in Decision Making, Decision Making, Organizational Culture, Managing Cultural Diversity.

UNIT-IV	Organizational Design	8 HOURS

Classical, Neoclassical and Contingency approaches to organizational design; Organizational theory and design, Organizational structure (Simple Structure, Functional Structure, Divisional Structure, Matrix Structure).

UNIT-V	Leadership and Managerial Ethics	9 HOURS

Concept, Nature, Importance, Attributes of a leader, developing leaders across the organization, Leadership Grid. Ethics and Business, Ethics of Marketing & advertising, Ethics of Finance & Accounting, Decision – making frameworks, Business and Social Responsibility, International Standards, Corporate Governance, Corporate Citizenship, Corporate Social Responsibility.

Course outcome: After completion of this course, students will be able to

CO 1	Remember management concepts & theories.	K2, K1
CO 2	Understand and apply the principles of planning, organizing & directing in solving contemporary issues of organization.	K3
CO 3	Analyze and evaluate the behavior for enhancing individual and group performance.	K2, K5
CO 4	Understand and apply concept of organizational design.	K2, K4
CO 5	Understand and apply leadership theories in business situations.	K4

Textbooks

1. Richard L. Daft, Understanding the Theory and Design of Organizations

2. Koontz Harold, Weihrich Heinz& Mark V. Cannice – Essentials of management (Tata McGraw Hill,11th Edition,2020)

Reference Books

1. Robbins &Coulter :Management (Pearson, 15th Edition, 2021)
2. Pareek Udai :Understanding Organizational Behaviour, (Oxford University Press, 4th Edition, 2016)

B. TECH THIRD YEAR

Course Code	ACSBS0551	L T P	Credit
Course Title	DESIGN AND ANALYSIS OF ALGORITHMS LAB	0 0 2	1

List of Experiments

Sr. No.	Name of Experiment	CO
1	Program for Recursive Binary & Linear Search.	CO1, CO2
2	Program for Heap Sort.	CO1
3	Program for Merge Sort.	CO2
4	Program for Insertion Sort.	CO1
5	Program for Quick Sort.	CO2
6	Program to implement Knapsack Problem using Greedy Solution.	CO3
7	Program for 0/1 knapsack.	CO4
8	Program for LCS.	CO4
9	Program for BFS and DFS.	CO1
10	Program to implement Dijkstra's Algorithm.	CO4
11	Program to find Minimum Spanning Tree using Kruskal's Algorithm.	CO3
12	Program to implement N Queen Problem using Backtracking.	CO4

Lab Course Outcome: After the completions of this course students will be able to

CO 1	Implement algorithm to solve problems by iterative approach.	K3
CO 2	Implement algorithm to solve problems by divide and conquer approach.	K3
CO 3	Implement algorithm to solve problems by Greedy algorithm approach.	K3
CO 4	Implement algorithm to solve problems by Dynamic programming, backtracking, branch and bound approach.	K3

B. TECH. THIRD YEAR			
Course Code	**ACSBS0552**	**L T P**	**Credit**
Course Title	**COMPILER DESIGN LAB**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Construction of NFA from REGULAR EXPRESSION	CO1
2	Construction of DFA from NFA	CO1
3	Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language.	CO1
4	Implementation of LEXICAL ANALYZER for IF STATEMENT	CO2
5	Implementation of LEXICAL ANALYZER for ARITHMETIC EXPRESSION	CO2
6	Write a C program to implement LALR parsing	CO2
7	Implementation of OPERATOR PRECEDENCE PARSER	CO3
8	Implementation of RECURSIVE DESCENT PARSER	CO3
9	Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.	CO3
10	Implementation of SHIFT REDUCE PARSING ALGORITHM	CO2
11	a) *Write a C program to implement operator precedence parsing. b) *Write a C program to implement Program semantic rules to calculate the expression that takes an expression with digits, + and * and computes the value.	CO3
12	Implementation of CODE GENERATOR.	CO4
13	Write a C program to generate machine code from abstract syntax tree generated by the parser.	CO5
14	Implementation of CODE OPTIMIZATION TECHNIQUES	CO5

Lab Course Outcome:

CO 1	Develop language and expression	K3
CO 2	Implement syntax analyzer in different methods	K3
CO 3	Explore semantic analyzer using different type of programs	K2
CO 4	Perform code generation	K3
CO 5	Perform code optimization and machine code	K3

B. TECH. THIRD YEAR (ELECTIVE 1)

Course code	ACSBS0511	L T P	Credits
Course title	CONVERSATIONAL SYSTEMS	3 0 0	3

Course objective:

The objective of this course is to understand the fundamental concepts of conversational systems, learn about NLP and applications of NLTK. It helps students to understand cloud-based platforms for developing a conversational system

Pre-requisites: Basic Knowledge of AI

Course Contents / Syllabus

UNIT-I	FUNDAMENTALS OF CONVERSATIONAL SYSTEMS	8 Hours

Overview, Case studies, Explanation about different modes of engagement for a human being, History and impact of AI Natural Language Processing, Artificial Intelligence and Machine Learning, NLG, Speech-To-Text, Text-To-Speech, Computer Vision etc. Google, MS, Amazon &Market trends Alexa, Google Home and other new channels, Ethical and Legal Considerations in AI Overview, Basic Python programming concepts, Node Basics, Coding, Best Practices

UNIT-II	NATURAL LANGUAGE PROCESSING	8 Hours

Brief history, Basic Concepts, Phases of NLP, Application of chatbots etc Information Extraction, Sentiment Analysis NLP using Python - Make use of any of the NLP libraries like NLTK, spaCy, Stanford NLP etc. (Practice session to use an NLP Tool -Hands on) Affective NLG

UNIT-III	CONVERSATIONAL AI SYSTEMS	8 Hours

Fundamentals of Conversational Systems (NLU, DM and NLG) Chatbot framework & Architecture, Conversational Flow & Design, Intent Classification (ML and DL based techniques), Dialogue Management Strategies, Natural Language Generation UX design, APIs and SDKs, Usage of Conversational Design Tools, Google Dialog flow, Microsoft Bot Framework, Amazon Lex, RASA Channels: Facebook Messenger, Google Home, Alexa, WhatsApp, Custom Apps, Overview of CE Testing techniques, A/B Testing, Introduction to Testing Frameworks - Botium /Mocha,Chai, Security & Compliance – Data Management, Storage, GDPR, PCI, Building a Voice/ChatBot – Hands-on.

UNIT-IV	ROLE OF ML/AI IN CONVERSATIONAL TECHNOLOGIES	8 Hours

Understanding on how Conversational Systems uses ML technologies in ASR, NLP, Advanced Dialog management, Language Translation, Emotion/Sentiment Analysis, Information extraction, etc. to effectively converse, Introduction to Contact centers – Impact & Terminologies, Case studies & Trends, how does a Virtual Agent/Assistant fit in here? Introduction to Contact centers – Impact & Terminologies, Case studies & Trends, how does a Virtual Agent/Assistant fit in here?

UNIT-V	OVERVIEW ON CONVERSATIONAL ANALYTICS	8 Hours

Conversation Analytics: The need of it, Introduction to Conversational Metrics, Summary, Robots, and Sensory Applications overview, XR Technologies in Conversational Systems, XR-Commerce, What to expect next? – Future technologies and market innovations overview

Course outcome: After completion of this course students will be able to:

CO 1	Understand and apply the fundamental concepts of Conversational systems	K3

CO 2	Explain and exemplify the concepts of NLP	K2
CO 3	Apply concepts of conversational AI	K3
CO4	Analyze role of ML & AI in conversational systems	K4
CO 5	Develop learning chatbot	K3

Textbooks:

5) Glenn J. Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining, John Wiley Publishers, 2007.

6) Data Analysis and Data Mining, 2nd Edition, John Wiley & Sons Publication, 2014.

Reference Books:

4) Open Data for Sustainable Community: Glocalized Sustainable Development Goals, Neha Sharma, Santanu Ghosh, Monodeep Saha, Springer, 2021.

5) The Data Science Handbook, Field Cady, John Wiley & Sons, Inc, 2017

6) Data Mining Concepts and Techniques, Third Edition, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann, 2012.

Links:

Unit 1	https://www.youtube.com/watch?v=KxryzSO1Fjs
Unit 2	https://www.springboard.com/blog/data-wrangling/
Unit 3	https://towardsdatascience.com/exploratory-data-analysis-in-r-for-beginners-fe031add7072
Unit 4	https://learn.datacamp.com/courses/exploratory-data-analysis-in-python http://ncss-tech.github.io/stats_for_soil_survey/chapters/4_exploratory_analysis/4_exploratory_analysis.html
Unit 5	https://onlinecourses.nptel.ac.in/noc20_cs80/preview https://nptel.ac.in/courses/106/106/106106179/ https://learn.datacamp.com/courses/introduction-to-data-visualization-with-ggplot2

B. TECH. THIRD YEAR (ELECTIVE I)

Course code	ACSBS0512	L T P	Credits
Course title	CLOUD, MICROSERVICES & APPLICATION	3 0 0	3

Course objective:

The course intends to introduce students to the fundamentals of developing an application the on Cloud, specifically public clouds such as AWS, AZURE and Google. Students would be able to appreciate

✓ How to design applications for Cloud

✓ Develop applications using various services

✓ Deploy applications on Cloud by using cloud-native services

Pre-requisites: Good knowledge of Basics of Programming concepts(OOP) covered through a course prior to this semester

Course Contents / Syllabus

UNIT-I	CLOUD FUNDAMENTALS	9 Hours

Cloud Fundamentals; Cloud Service Components, Cloud service/Deployment Models. Cloud components Guiding Principle with respect to utilization/Security/Pricing and the applications of Cloud. Public Cloud Platforms overview and their usage: AWS, Azure, Google

UNIT-II	API FUNDAMENTALS AND ITS INTEGRATION	9 Hours

Application architectures-Monolithic & Distributed, Microservice fundamental and design approach, Cloud Native applications-12 Factors App. Application integration process/Apification Process, API Fundamental. Microservice /API management, Spring boot Fundamental and design of microservice, API tools. Developer Portal. Applications of Microservice and APIFICATION.

UNIT-III	DEVOPS	4 Hours

Devops fundamentals, Tools and Applications Containerization Process and application.

UNIT-IV	CLOUD APPLICATION DEVLOPMENT USING PYTHON	10 Hours

Python- Refresher, Use cases for cloud application development.

Design and developing solution steps using containers, containerization of application and deployment using Kubernetes

Team Presentation of Project work/Thesis- Preliminary Round) and Review

UNIT-V	CLOUD SECURITY	10 Hours

Cloud Security and Monitoring Tools.

Team Presentation of Project work/Thesis- Final Round) and Review.

Course outcome: After completion of this course students will be able to:

CO 1	Understand the fundamental concepts of cloud computing and its platforms.	K1, K2
CO 2	Identify and sketch out API and Microservice fundamentals	K2
CO 3	Understand and analyze concepts of DevOps Tools and their usage in cloud application development.	K1, K3

CO4	Design and deploying cloud application using python in cloud environment	K6
CO 5	Analyze cloud security and monitoring tools and evaluate performance of cloud applications.	K4, K5

Text books:

1) 'Mastering Cloud Computing' by Rajkumar, Christian, S. Thamarai; Mc Graw Hill 2013
2) 'Cloud Computing' by Shailendra Singh ; Oxford higher education 2022

Reference Books:

1) Python API Development Fundamentals by Chan Jack, 2019, PACKT
2) Building Microservices by Sam Newman - Feb 19, 2015, O'reilly

B. TECH. THIRD YEAR (ELECTIVE I)

Course code	ACSBS0513	L T P	Credits
Course title	MACHINE LEARNING	3 0 0	3

Course objective:

This course covers fundamental concepts and methods of computational data analysis, including pattern classification, prediction, visualization, and recent topics in deep learning. The course will give the student the basic ideas and intuition behind modern machine learning methods as well as a bit more formal understanding of how, why, and when they work. The underlying theme in the course is statistical inference as it provides the foundation for most of the methods covered.

Pre-requisites: Basic Knowledge of Machine learning

Course Contents / Syllabus

UNIT-I	FOUNDATION FOR MACHINE LEARNING	8 Hours

Introduction, Examples of Various Learning Paradigms, Perspectives and Issues, Version Spaces, Finite and Infinite Hypothesis Spaces, PAC Learning, VC Dimension, ML Techniques overview, Validation Techniques (Cross-Validations), Feature Reduction/Dimensionality reduction, Principal components analysis (Eigen values, Eigen vectors, Orthogonality).

UNIT-II	SUPERVISED LEARNING	8 Hours

Decision Trees: ID3,C4.5, Classification and Regression Trees, Regression: Linear Regression, Multiple Linear Regression, Logistic Regression, Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machines: Linear and Non-Linear, Kernel Functions, Making Kernels and working in feature space , SVM for classification and regression problems. K-Nearest Neighbors

Computational geometry; Voronoi Diagrams; Delaunay Triangulations, K-Nearest Neighbor algorithm; Wilson editing and triangulations, Aspects to consider while designing K-Nearest Neighbor.

UNIT-III	UNSUPERVISED LEARNING	8 Hours

Introduction to clustering, Distance measures, Different clustering methods (Distance, Density, Hierarchical), Iterative distance-based clustering, Dealing with continuous, categorical values in K-Means, Hierarchical: AGNES, DIANA, Partitional: K-means clustering, K-Mode Clustering, density-based clustering, Expectation Maximization, Gaussian Mixture Models.

UNIT-IV	PROBABILISTIC LEARNING	8 Hours

Bayesian Learning, Bayes Optimal Classifier, Naıve Bayes Classifier, Model Assumptions, Probability estimation, Bayesian Belief Networks.

Ensembles methods

Bagging & boosting and its impact on bias and variance, C5.0 boosting, Random Forest, Gradient Boosting Machines and XGBoost.

UNIT-V	ASSOCIATION RULE MINING	8 Hours

The applications of Association Rule Mining: Market Basket, Recommendation Engines, etc, A mathematical model for association analysis; Large item sets; Association Rules, Apriori: Constructs large item sets with mini sup by iterations; Interestingness of discovered association rules, Application examples; Association analysis vs. classification, FP-trees.

Reinforcement Learning

Introduction to Reinforcement Learning, Learning Task, Example of Reinforcement Learning in Practice, Learning Models for Reinforcement – (Markov Decision process, Q Learning – Q Learning function, Q Learning Algorithm), Application of Reinforcement Learning, Introduction to Deep Q Learning.

Case Study: Health Care, E-Commerce, Smart Cities.

Course outcome: After completion of this course students will be able to:

CO1	Appreciate the importance of visualization in the data analytics solution.	K2
CO2	Apply structured thinking to unstructured problems.	K3
CO3	Understand a very broad collection of machine learning algorithms and problems.	.K2
CO4	Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory.	K1
CO5	Develop an appreciation for what is involved in learning from data.	K6

Textbooks:

7) Marco Gori , Machine Learning: A Constraint-Based Approach, Morgan Kaufmann. 2017

8) Ethem Alpaydin, Machine Learning: The New AI, MIT Press-2016

9) Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995

10) Tom M. Mitchell, “Machine Learning”, McGraw-Hill, 2010

Reference Books:

7) Ryszard, S., Michalski, J. G. Carbonell and Tom M. Mitchell, Machine Learning: An Artificial Intelligence Approach, Volume 1, Elsevier. 2014

8) Stephen Marsland, Taylor & Francis 2009. Machine Learning: An Algorithmic Perspective.

9) Ethem Alpaydin, (2004) “Introduction to Machine Learning (Adaptive Computation and Machine Learning)”, The MIT Press.

10) Fundamentals of Machine Learning for Predictive Data Anayltics: Algorithms, Worked Examples, and Case Studies 1st Edition by John D. Kelleher javascript:void(0)

Links:

Unit 1	https://www.youtube.com/watch?v=fC7V8QsPBec&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=2
Unit 2	https://www.youtube.com/watch?v=OTAR0kT1swg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=3 https://www.youtube.com/watch?v=OCwZyYH14uw https://www.youtube.com/watch?v=9_LY0LiFqRQ

	https://www.youtube.com/watch?v=EYeF2e2IKEo https://www.youtube.com/watch?v=_PwhiWxHK8o https://www.youtube.com/watch?v=wTF6vzS9fy4 https://www.youtube.com/watch?v=lt65K-REdHw
Unit 3	https://www.youtube.com/watch?v=HTSCbxSxsg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=4 https://www.youtube.com/watch?v=NnlS2BzXvyM https://www.youtube.com/watch?v=7enWesSofhg
Unit 4	https://youtu.be/rthuFS5LSOo https://youtu.be/kho6oANGu_A
Unit 5	https://www.youtube.com/watch?v=9vMpHk44XXo&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=5 Reinforcement Learning Tutorial | Reinforcement Learning Example Using Python | Edureka - YouTube Association Rule Mining - Solved Numerical Question on Apriori Algorithm(Hindi) - YouTube Q Learning Explained | Reinforcement Learning Using Python | Q Learning in AI | Edureka - YouTube

B. TECH. THIRD YEAR (ELECTIVE-II)

Course Code	ACSBS0514	L T P	Credit
Course Title	BEHAVIORAL ECONOMICS	2 1 0	3

Course objective: The objective of this course is to impart knowledge on current ideas and concepts regarding decision making in Economics, particularly from a behavioral science perspective, which can affect choices and behavior of firms, households and other economic entities.

Prerequisites: Student must have basic understanding of General Management.

Course Contents / Syllabus

UNIT-I Introduction to Behavioral Economics — 8 Hours

The neoclassical/standard model and behavioral economics in contrast; historical background; behavioral economics and other social sciences; theory and evidence in the social sciences and in behavioral economics; applications – gains and losses, money illusion, charitable donation.

UNIT-II Basics of Choice Theory — 8 Hours

Revisiting the neoclassical model; utility in economics and psychology; models of rationality; connections with evolutionary biology and cognitive neuroscience; policy analysis – consumption and addiction, environmental protection, retail therapy; applications – pricing, valuation, public goods, choice anomalies.

UNIT-III Beliefs, Heuristics and Biases — 8 Hours

Revisiting rationality; causal aspects of irrationality; different kinds of biases and beliefs; self-evaluation and self-projection; inconsistent and biased beliefs; probability estimation; trading applications – trade in counterfeit goods, financial trading behavior, trade in memorabilia.

UNIT-IV Choice Under Uncertainty — 8 Hours

Background and expected utility theory; prospect theory and other theories; reference points; loss aversion; marginal utility; decision and probability weighting; applications – ownership and trade, income and consumption, performance in sports.

Review of game theory and Nash equilibrium – strategies, information, equilibrium in pure and mixed strategies, iterated games, bargaining, signaling, learning; applications – competitive sports, bargaining and negotiation, monopoly and market entry.

UNIT-V Intertemporal Choice — 8 Hours

Geometric discounting; preferences over time; anomalies of inter-temporal decisions; hyperbolic discounting; instantaneous utility; alternative concepts – future projection, mental accounts, heterogeneous selves, procedural choice; policy analysis – mobile calls, credit cards, organization of government; applications – consumption and savings, clubs and membership, consumption planning.

Individual preferences; choice anomalies and inconsistencies; social preferences; altruism; fairness; reciprocity; trust; learning; communication; intention; demographic and cultural aspects; social norms; compliance and punishment; inequity aversion; policy analysis – norms and markets, labor markets, market clearing, public goods; applications – logic and knowledge, voluntary contribution, compensation design.

Course outcome:	At the end of course, the student will be able	
CO 1	Understand the concept of Behavioral Economics.	K2, K1
CO 2	Understand and analyze the basic concept of choice theory.	K3
CO 3	Understand and analyze different types of biases and beliefs.	K2, K4
CO 4	Analyze and evaluate decision making under uncertainty.	K2, K5
CO 5	Understand the application of game theory in decision making.	K4

Text books

1. An Introduction to Behavioral Economics, by N. Wilkinson and M. Klaes (Macmillan)

Reference Books

1. Managerial Economics,Problem solving in a Digital World, Nick Wilkinson, Cambridge University Press,
2. Managerial Economics, Theory, Practice & Problems, Douglas Evan J, PHF, New Delhi;

B. TECH. THIRD YEAR (ELECTIVE-II)

Course Code	ACSBS0515	L T P	Credit
Course Title	COMPUTATIONAL FINANCE & MODELING	2 1 0	3

Course objective: Understand the existing financial models in a quantitative and mathematical way: the financial model of Black-Scholes, concepts of financial markets, risk management, and financial engineering, and calculate the price of options and financial data and trading systems.

Prerequisites: Student must have basic understanding of Mathematical Finance and Financial Market**.**

Course Contents / Syllabus

UNIT-I	Introduction to Mathematical Finance	10 Hours

Numerical methods relevant to integration, differentiation and solving the partial differential equations of mathematical finance: examples of exact solutions including Black Scholes and its relatives, finite difference methods including algorithms and question of stability and convergence, treatment of near and far boundary conditions, the connection with binomial models, interest rate models, early exercise, and the corresponding free boundary problems, and a brief introduction to numerical methods for solving multi-factor models.

UNIT-II	Black-Scholes framework	10 Hours

Black-Scholes framework: Black-Scholes PDE: simple European calls and puts; put-call parity. The PDE for pricing commodity and currency options. Discontinuous payoffs - Binary and Digital options. The Greeks: theta, delta, gamma, vega & rho and their role in hedging. The mathematics of early exercise - American options: perpetual calls and puts; optimal exercise strategy and the smooth pasting condition. Volatility considerations - actual, historical, and implied volatility; local vol and volatility surfaces.

Simulation including random variable generation, variance reduction methods and statistical analysis of simulation output. Pseudo random numbers, Linear congruential generator, Mersenne twister RNG. The use of Monte Carlo simulation in solving applied problems on derivative pricing discussed in the current finance literature. The technical topics addressed include importance sampling, Monte Carlo integration, Simulation of Random walk and approximations to diffusion processes, martingale control variables, stratification, and the estimation of the "Greeks."

UNIT-III	Financial Products and Markets	10 Hours

Financial Products and Markets: Introduction to the financial markets and the products which are traded in them: Equities, indices, foreign exchange, and commodities. Options contracts and strategies for speculation and hedging.

UNIT-IV	Options	10 Hours

Application areas include the pricing of American options, pricing interest rate dependent claims, and credit risk. The use of importance sampling for Monte Carlo simulation of VaR for portfolios of options.

UNIT-V	Statistical Analysis of Financial Returns and Hedging in financial markets.	10 Hours

Statistical Analysis of Financial Returns: Fat-tailed and skewed distributions, outliers, stylized facts of volatility, implied volatility surface, and volatility estimation using high frequency data.

Copulas, Hedging in incomplete markets, American Options, Exotic options, Electronic trading, Jump Diffusion Processes, High-dimensional covariance matrices, Extreme value theory, Statistical Arbitrage.

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

CO 1	Understand the concept of financial models in a quantitative and mathematical form.	K2, K1
CO 2	Analyze and evaluate financial model of Black-Scholes.	K3

CO 3	Demonstrate the applicability of financial market products.	K2, K4
CO 4	Analyze the various options for investment	K2, K5
CO 5	Analyze and evaluate financial return and hedging in incomplete markets.	K2

Textbooks:

1. R. S. Tsay, Analysis of Financial Time Series
2. Madhu Vij, International Financial Management, 2021 4th edition

Reference Books

1. A. Lewis: Option Valuation under Stochastic Volatility, Finance Press, Newport Beach,California, 2000.
2. P. Glasserman: Monte Carlo Methods in Financial Engineering, Springer-Verlag, New York,2004.
3. R. Seydel: Tools for Computational Finance, 2nd edition, Springer-Verlag, New York, 2004.

B. TECH. THIRD YEAR (ELECTIVE-II)

Course Code	ACSBS0516	L T P	Credit
Course Title	INDUSTRIAL PSYCHOLOGY	2 1 0	3

Course objective: Introduces students to the content areas of industrial psychology and the application of psychological theory to organizational issues. Topics include employment law, job analysis, recruitment and selection, training, performance appraisal and discipline, employee motivation, and workplace safety. Using an applied approach, this course will help prepare students for their roles as employees and managers.

Prerequisites: Student must have basic understanding of General Management.

Course Contents / Syllabus

UNIT-I	Introduction to Industrial Psychology	8 Hours

Nature and Meaning of Industrial Psychology, Major influences on industrial psychology- Scientific management and Human relations schools, Taylorism and Scientific management, Hawthorne Experiments.

UNIT-II	Individual in Workplace	8 Hours

Motivation and Job satisfaction, Stress management, Organizational culture, Leadership, Work Teams and Groups dynamics.

UNIT-III	Work Environment and Engineering Psychology- Fatigue	8 Hours

Boredom, accidents and safety, Job analysis and Competency modelling, Recruitment and Selection- Reliability and Validity of recruitment tests and measures.

UNIT-IV	Performance Management	8 Hours

Training and Development, Basic motivation concepts and their applications, Understanding Organizational culture, Organizational change.

UNIT- V	Managerial Psychology	8 Hours

The functions performed by effective managers, Manager as a decision maker, Psychological aspects of managerial decision making.

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

CO 1	Understand the concept of Industrial psychology in terms of the key factors that influence organisational behavior.	K2, K1
CO 2	Ability to understand and demonstrate good inter-personal relationship in an organization.	K3
CO 3	Ability to analyze the existing jobs and design suitable jobs to provide certain amount of challenge and job satisfaction.	K2, K4
CO 4	Ability to analyze the complexities associated with the training and development and organization culture in the organization.	K2, K5
CO 5	Ability to handle human resources efficiently.	K4

Text books

1. Robbins Stephen P& Judge Timothy A. ―Organizational Behaviour (Pearson)
2. Newstrom J. W., & Davis, K. (2011) Human behavior at work (12th ed.). Tata McGraw Hill

Reference Books

1. Miner J.B. (1992) Industrial/ Organizational psychology. NY: McGraw Hill
2. Luthans Fred: Organizational Behaviour, (McGraw Hill International Edition, 12th Edition,2013)
3. Aamodt, M.G. (2007) Industrial/ Organizational Psychology: An applied approach (5^{th} ed.) Wadsworth/ Thompson: Belmont, C.A.
4. Aswathappa K. (2008). Human Resource Management (5^{th} ed.) New Delhi: Tata McGraw Hill.

B. TECH. THIRD YEAR (ELECTIVE-I)			
Course Code	**ACSBS0511P**	**L T P**	**Credit**
Course Title	**CONVERSATIONAL SYSTEMS LAB**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Write a program to design a chatbot in python.	CO1
2	Creating an account in amazon AWS and understanding Alexa Skill Kit and developer console.	CO1
3	Creating Intents, utterances and invocation in AWS for developing an Alexa Skill	CO1
4	Creating Intents, utterances and invocation in AWS for developing an Alexa Skill	CO1
5	Develop an Alexa Skill for NIET Admissions FAQ	CO1
6	Develop an Alexa Skill for NIET Navigation	CO1
7	To perform text analysis using NLTK.	CO1
8	To perform Sentiment Analysis using NLTK	CO3

Lab Course Outcome:

CO 1	Develop AI Chatbots.	K3
CO 2	Explore AWS Alexa Skill Kit	K2
CO 3	Apply Intents, Invocations and slots in AWS	K3
CO 4	Develop Alexa Chatbot using AWS	K3
CO 5	Apply NLTK for developing NLP based projects	K3

B. TECH. THIRD YEAR (ELECTIVE 1)			
Course Code	**ACSBS0512P**	**L T P**	**Credit**
Course Title	**CLOUD, MICROSERVICES & APPLICATION LAB**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Configure cloud architectural design for Business applications	CO1
2	Create and analyze public and private cloud services	CO1
3	Apply scaling to cloud services according to need of business.	CO1
4	Configure design and deployment steps for API/Microservice on cloud platforms	CO2
5	Create AWS lambda services and analyze its usage in API integration	CO2
6	Prepare and formulate Devops Tools usages for Automation in development and deployment of cloud applications	CO3
7	Design and deploy web service/ RESTful services on cloud environment.	CO4
8	Configure the security steps in deployment of cloud application/ microservices,	CO5
9	Implement the monitoring tool for analysis of cloud-based application	CO5

Lab Course Outcome: After completion of this course students will be able to:

CO 1	Design and create basic cloud services for business applications	K3, K6
CO 2	Configure procedure of cloud application deployment/ Integration.	K3
CO 3	Analyse DevOps tool for automation in development and deployment of cloud application.	K4
CO 4	Design and develop API/ Application/ Services using python on cloud environment.	K3, K6
CO 5	Evaluate cloud security and monitoring tools features of cloud applications.	K5

B. TECH. THIRD YEAR (ELECTIVE-I)			
Course Code	**ACSBS0513P**	**L T P**	**Credit**
Course Title	**MACHINE LEARNING LAB**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Write a program to perform various types of regression (Linear & Logistic).	CO2
2	Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a CSV file.	CO1
3	Write a program to demonstrate the working of the decision tree based ID3algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.	CO2
4	Write a program to implement k-Nearest Neighbour algorithm to classify the iris dataset. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.	CO1
5	Apply EM algorithm to cluster a set of data. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering.	CO3
6	Implement Support Vector Machine using Scikit-learn.	CO5
7	Implement the non-parametric Locally Weighted Regression algorithm to fit data points. Select appropriate data set for your experiment and draw graphs.	CO1
8	Implement Gradient Boosting Machine Ensemble in Python.	CO4
9	Implement Apriori algorithm using sample data in Python.	CO5
10	Implement naïve Bayesian Classifier model. Write the program to calculate the accuracy, precision, and recall for your data set.	CO4

Lab Course Outcome:

CO1	Understand the implementation procedures for the machine learning algorithms.	K2
CO2	Design Java/Python programs for various Learning algorithms.	K6
CO3	Apply appropriate data sets to the Machine Learning algorithms.	K3
CO4	Identify and apply Machine Learning algorithms to solve real world problems.	K2

CO5	Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own.	K6

B. TECH. THIRD-YEAR

Course code	ACSBS0601	L T P	Credits
Course title	ARTIFICIAL INTELLIGENCE	3 0 0	3

Course objective: Introduction to history of AI and foundations, as well as knowledge with AI concepts for problem solving, inference, perception, knowledge representation, and learning, forms of learning, planning and computation statistics which are used to acquire knowledge.

Pre-requisites: Basic knowledge of AI and Machine Learning Concepts.

Course Contents / Syllabus

UNIT-I	AI AND PROBLEM SOLVING	8 Hours

Introduction, Overview of Artificial intelligence: Problems of AI, AI technique, Tic-Tac-Toe problem, Intelligent Agents, Agents & environment, Nature of environment, Structure of agents, Goal-based agents, Utility-based agents, Learning agents.

Problem Solving, Problems, Problem Space & search: Defining the problem as state-space search, production system, problem characteristics, and Issues in the design of search programs.

UNIT-II	SEARCH TECHNIQUES	8 Hours

Search techniques: Problem-solving agents, searching for solutions; uniform search strategies: breadth-first search, depth-first search, depth limited search, bidirectional search, comparing uniform search strategies. Heuristic search strategies Greedy best-first search, A* search, AO* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search.

UNIT-III	AI PROBLEMS AND KNOWLEDGE REPRESENTATION:	8 Hours

Constraint satisfaction problems: Local search for constraint satisfaction problems. Adversarial search, Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening.

AI problems and Knowledge Representation: Water Jug Problem, Missionaries-Cannibals Problem, n-Queen problem, monkey banana problem, Travelling Salesman Problem. Knowledge representation, Knowledge representation issues, representation & mapping, approaches to knowledge representation Procedural Knowledge, Inheritable Knowledge, Declarative knowledge, Semantic nets, partitioned nets, Frames, Common Sense reasoning, and thematic role frames.

UNIT-IV	INTRODUCTION TO LOGIC:	8 Hours

Representing simple facts in logic, Propositional Logic, Semantic Tableaux in Propositional Logic, Resolution in Propositional Logic, using predicate logic, representing instant & ISA relationship, computable functions & predicates, Semantic Tableaux in Predicate Logic, Prenex Normal Form, Skolemization, resolution, natural deduction. Representing knowledge using rules, and logic programming.

UNIT-V	PROBABILISTIC REASONING & EXPERT SYSTEMS IN AI	8 HOURS

Reasoning in Uncertainty: Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Planning Overview, components of a planning system, Goal stack planning, Hierarchical planning, other planning techniques, Planning with state Space Search, Conditional Planning, Continuous planning, Multi-Agent Planning, Forms of learning, inductive learning, Reinforcement Learning, learning decision trees, Neural Net learning, and Genetic learning

Expert Systems: Representing and using domain knowledge, Architecture of knowledge-Based Systems, Rule-based systems, Forward and Backward Chaining, expert system shells, and knowledge acquisition.

Course outcome: After completion of this course students will be able to:

CO 1	Understand the fundamentals of AI problem solving and its foundations	K2
CO 2	Apply principles of AI in solutions that require problem-solving, inference, and perception	K3
CO 3	Explain strong familiarity with a number of important AI techniques, including in particular intelligent search methods and solutions	K3
CO4	Understand the basics of Logic and the ways to process logic to solve real-world problems.	K3
CO 5	Assess/ Evaluate critically the techniques presented and apply them to real-world problems	K5

Textbooks:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education. Fourth Edition 2021.
2. Artificial Intelligence, Russel, Pearson, Fourth Edition 2020.

Reference Books:

1. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill 3rdEdition 2010
2. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
3. Logic & Prolog Programming, Saroj Kaushik, New Age International
4. Expert Systems, Giarranto, VIKAS.

Links:

Unit 1	https://nptel.ac.in/courses/106/106/106106198/
Unit 2	https://nptel.ac.in/courses/111/107/111107137/
Unit 3	https://nptel.ac.in/courses/106/106/106106202/
Unit 4	https://nptel.ac.in/courses/106/106/106106213/
Unit 5	https://nptel.ac.in/courses/106/105/106105152/

B. TECH. THIRD YEAR

Course code	ACSBS0602	L T P	Credits
Course title	COMPUTER NETWORKS	3 0 0	3

Course objective: The objective of this course is to understand the fundamental concepts of computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems.

Pre-requisites: Basic Knowledge of Computer Networks

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO COMPUTER NETWORKS:	8 Hours

Computer networks and distributed systems, Classifications of computer networks, Preliminaries of layered network structures. **Data communication Components:** Representation of data and its flow, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media.

UNIT-II	Techniques for Bandwidth utilization	8 Hours

Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.
LAN: Wired LAN, Wireless LAN, Virtual LAN.

UNIT-III	Data Link Layer and Medium Access Sub Layer	8 Hours

Fundamentals of Error Detection and Error Correction, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go-back–N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA

UNIT-IV	Network Layer AND Transport Layer	8 Hours

Network Layer: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service (QoS), QoS improving techniques - Leaky Bucket and Token Bucket algorithms.

UNIT-V	Application Layer AND NETWORK SECURITY	8 Hours

Application Layer: DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls.

Network Security: Electronic mail, directory services and network management, Basic concepts of Cryptography.

Course outcome: After completion of this course students will be able to:

CO 1	Understand the basics of computer network and the Explanation of OSI model	K3
CO 2	Discuss the key technological components of the Network.	K2

CO 3	Study Data link layer and Medium Access sub layer in details	K3
CO4	Analyze Network and Transport layer	K4
CO 5	Analyze Application layer and Illustrate various Network Security	K3

Text books:

1) *Computer Networks*, A. Tannenbaum. Fifth Edition
https://www.mbit.edu.in/wp-content/uploads/2020/05/Computer-Networks-5th-Edition.pdf

2) *Data and Computer Communication*, William Stallings. Eighth Edition
https://memberfiles.freewebs.com/00/88/103568800/documents/Data.And.Computer.Communications.8e.WilliamStallings.pdf

Reference Books:

1) *Network Security*, Kaufman, R. Perlman and M. Speciner.

2) *UNIX Network Programming*, Vol. 1,2 & 3, W. Richard Stevens

Links:

Unit 1	https://www.youtube.com/watch?v=4D55Cmj2t-A
Unit 2	https://www.youtube.com/watch?v=UAKok0wg1p8 https://www.youtube.com/watch?v=IR-p1A_PQ3w https://www.youtube.com/watch?v=LN1NlN5Q3YI
Unit 3	https://www.youtube.com/watch?v=JRgmPco0KWI https://www.youtube.com/watch?v=WYM9nFYnYAg https://www.youtube.com/watch?v=G0h0dC4Zycs
Unit 4	https://www.youtube.com/watch?v=rW1jPlYgp_0 https://www.youtube.com/watch?v=kAty4mKczEg
Unit 5	https://www.youtube.com/watch?v=8An0dRalJeM https://www.youtube.com/watch?v=6Jubl1UnJTE

B. TECH. THIRD YEAR

Course code	ACSBS0603	L T P	Credits
Course title	INFORMATION SECURITY	3 0 0	3

Course objective:

The objective of this course is to understand the fundamental concepts of security parameters, access control, System Design and Information Security.

Pre-requisites: Basic Computer Knowledge

Course Contents / Syllabus

UNIT-I	Overview of Security Parameters	8 Hours

Confidentiality, integrity and availability; Security violation and threats; Security policy, and procedure; Assumptions and Trust; Security Assurance, Implementation and Operational Issues; Security Life Cycle.

UNIT-II	Access Control and Security Policies	8 Hours

Access Control Models: Discretionary, mandatory, roll-based and task-based models, unified models, access control algebra, temporal and spatial-temporal models.

Security Policies: Confidentiality policies, integrity policies, hybrid policies, non-interference and policy composition, international standards.

UNIT-III	Systems Design	8 Hours

Design principles, representing identity, control of access and information flow, confinement problem. Assurance: Building systems with assurance, formal methods, evaluating systems.

UNIT-IV	Logic-based System	8 Hours

Malicious logic, vulnerability analysis, auditing, intrusion detection. Applications: Network security, operating system security, user security, program security.

Special Topics: Data privacy, introduction to digital forensics, enterprise security specification.

UNIT-V	Operating Systems Security	8 Hours

Security Architecture, Analysis of Security in Linux/Windows.

Database Security: Security Architecture, Enterprise security, Database auditing.

Course outcome: After completion of this course students will be able to:

CO 1	Understand confidentiality, integrity and availability along with security parameters.	K2
CO 2	Outline access control mechanisms and security policies.	K1

CO 3	Design secured information systems.	K3
CO4	Analyze malicious logics and vulnerabilities in system design	K4
CO 5	Illustrate operating system security and database security.	K2

Text books:

1) *Security Engineering*, Ross Anderson.

2) *Information Security: Principles and Practice*, M. Stamp.

Reference Books:

1) *Security in Computing*, C.P. Pfleeger, S.L. Pfleeger, J. Margulies.

2) *Secure Programming HOWTO*, David Wheeler.

3) *Handbook of Database Security*, M. Gertz, S. Jajodia.

Links:

Unit 1	https://www.youtube.com/watch?v=KxryzSO1Fjs
Unit 2	https://www.springboard.com/blog/data-wrangling/
Unit 3	https://towardsdatascience.com/exploratory-data-analysis-in-r-for-beginners-fe031add7072
Unit 4	https://learn.datacamp.com/courses/exploratory-data-analysis-in-python http://ncss-tech.github.io/stats_for_soil_survey/chapters/4_exploratory_analysis/4_exploratory_analysis.html https://www.youtube.com/watch?v=32o0DnuRjfg

B.TECH. THIRD YEAR

Course code	ACSBS0604	L T P	Credit
Course title	BUSINESS COMMUNICATION & VALUE SCIENCE – IV	2 1 0	3

Course objective: The students must recognize and learn the best practices of communicative writing and public speaking. They must understand the importance of emotional intelligence and diversity in the work place. They should be familiar with corporate etiquettes and corporate social responsibility (CSR).

Pre-requisites: Basic Knowledge of English (verbal and written) Completion of all units from Semester 1, 2 and 4.

Course Contents / Syllabus

UNIT-I	Communicative writing	12.5 Hours

Auld Lang Syne This will be a group activity in which the lecturer will give some key words (from what they have taught in the previous semesters). **Concept of diversity in corporate environments. Communicative Writing:** Principles of Communicative Writing: Formal and Business letters, **writing proposals, How to tell a story with charts and graphs?**
Emotional Intelligence: Ref reading: 10 Ways to Build EI by Daniel Goleman. **Why do we need public speaking? Public speaking – best practice, Get, Set, go – sell your start-up ideas.**
Let's relax : Anubhaav Activity.

UNIT-II	Corporate Social Responsibility (CSR)	5 Hours

Corporate Social Responsibility (CSR), Why do corporates need to engage in CSR? Is it for compliance only? **Tell a CSR story**
Attributes required for work and life
Let's relax: Anubhaav Activities.

UNIT-III	Image Management	4 Hours

Who am I? (Image Management. Building a perfect image)
Examination Result Activity - Locus of control
Applying emotional intelligence
Let's relax: Anubhaav Activities.

Unit IV	Diversity	6.5 Hours

Sensitivity to diversity – Quiz
Understanding conflicts
Tips to manage conflicts, Corporate etiquette
Mock interviews followed by discussions on corporate etiquette
Business idioms and Corporate Terms
Managing Stress

Unit V	Stress management and time management	4.5 Hours

Tips to manage stress
Time management: Managing your time better
Time Squared Activity:
Let's relax: Anubhaav Activities
Create memories: Recap activity on the entire BCVS Course.

Project: Create a POC (Proof of Concept) for their start-up applying their learnings from the CSBS course (core subjects + BCVS).

Course Outcomes: Upon completion of the course, students shall have ability to

CO1	Understand the importance of diversity in the workplace and best practices of communicative writing	K2
CO2	Understand the importance of corporate social responsibility (CSR) and impact of stress in life and work	K2
CO3	Apply emotional intelligence in real life	K3
CO4	Recognize and apply the concepts of multiple intelligences and learning styles, sharing of feedback for better communication and growth in a corporate environment.	K3
CO5	Recognize and apply the best practices for time and stress management	K3

Textbook

There are no prescribed texts for Semester VI – there will be handouts and reference links shared.

Reference Books

1	Emotional Intelligence: Why it Can Matter More Than IQ by Daniel Goleman
2	Putting Emotional Intelligence to Work by Ryback David
3	How to Develop Self Confidence and Improve Public Speaking - Time - Tested Methods of Persuasion by Dale Carnegie
4	TED Talks: The official TED guide to public speaking: Tips and tricks for giving unforgettable speeches and presentations

Web References:

https://www.tata.com/about-us/tata-group-our-heritage

https://economictimes.indiatimes.com/tata-success-story-is-based-on-humanity-philanthropy-and-ethics/articleshow/41766592.cms

Online Resources:

https://youtu.be/reu8rzD6ZAE
https://youtu.be/Wx9v_J34Fyo
https://youtu.be/F2hc2FLOdhI
https://youtu.be/wHGqp8lz36c
https://youtu.be/hxS5He3KVEM
https://youtu.be/nMPqsjuXDmE

B. TECH. THIRD YEAR

Course Code	ACSBS0605	L T P	Credit
Course Title	FINANCIAL & COST ACCOUNTING	2 0 0	2

Course Objective: The objective of this course is to create an awareness about the importance and usefulness of the accounting concepts and their managerial implications and to create an awareness about cost accounting, different types of costing and cost management

Prerequisites: Student must have basic understanding of financial Accounting**.**

Course Contents / Syllabus

UNIT-I	Accounting Concept & Accounting Process	8 Hours

Introduction, Techniques and Conventions, Book Keeping and Record Maintenance ,Fundamental Principles , Accounting Standards , Double Entry Journal, Ledger, Trial Balance, Balance Sheet, Cash Book and Subsidiary Books Rectification of Errors.

UNIT-II	Financial Statement-Understanding & Interpreting	8 Hours

Financial Statements: Form and Contents of Financial Statements, Analyzing and Interpreting Financial Statements, Accounting Standards. Cash Flow and Fund Flow Techniques: Introduction, How to prepare, Difference between them , Class Discussion: Corporate Accounting Fraud- A Case Study of Satyam.

UNIT III	Overview of Cost Accounting	8 Hours

Costing Systems: Elements of Cost, Cost Behavior, Cost Allocation, OH Allocation ,Unit Costing, Process Costing, Job Costi.

UNIT IV	Overview of management accounting	8 Hours

Absorption Costing, Marginal Costing, Cost Volume Profit Analysis, Budgeting and Budgetary control, ABC Analysis.

Class Discussion: Application of costing concepts in the Service Sector.

UNIT V	Company Accounts and Annual Reports	8 Hours

Audit Reports and Statutory Requirements, Directors Report, Notes to Accounts, Pitfalls.

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

CO 1	Understand the concept of Financial and Cost Accounting	K2, K1
CO 2	To create an awareness about the importance and usefulness of the accounting concepts and their managerial implications.	K3
CO 3	To develop an understanding of the financial statements and the underlying principles and learn to interpret financial statements	K2, K4
CO 4	To create an awareness about cost accounting, different types of costing and cost management.	K2, K5
CO 5	Create the conducive work environment for target costing and life cycle cost analysis.	K4

Text books

1. Robert N Anthony, David Hawkins, Kenneth Marchant, *Accounting: Texts and Cases*, McGraw-Hill
2. Case Study Materials: To be distributed for class discussion

Reference Books

1. Mukherjee - Financial Accounting for Management (TMH, 2nd Edition).
2. Narayanswami - Financial Accounting: A Managerial Perspective (PHI,5th Ed)
3. Jerry J. Weygandt - Financial Accounting, 10e WileyPLUS (next generation) + Loose-leaf
4. MN Arora- A Textbook of Cost and Financial Accounting- 9th Edition- Vikas Publication
5.N.L.Ahuja-Financial Accounting and Analysis-Taxmann Publication-2016

B. TECH. THIRD YEAR			
Course Code	**ACSBS0651**	**L T P**	**Credit**
Course Title	**ARTIFICIAL INTELLIGENCE LAB**	**0 0 2**	**1**
List of Experiments:			
Sr. No.	**Name of Experiment**		**CO**
1	Write a R program to create a Data frames which contain details of 5 employees and display the details.		CO1
2	Write a R program to get the first 10 Fibonacci numbers.		CO1
3	Write a R program to get all prime numbers up to a given number.		CO1
4	Write a R program to find the maximum and the minimum value of a given vector.		CO1
5	Create an array, passing in a vector of values and a vector of dimensions, also provide names for each dimension.		CO1
6	Write a R program to create a list containing a vector, a matrix and a list and give names to the elements in the list. Access the first and second element of the list.		CO1
7	Write a R program to create a list containing a vector, a matrix and a list and add element at the end of the list.		CO1
8	Read the following file formats in Python/R: • Comma-separated values • XLSX • ZIP • Plain Text (txt) • JSON • XML • HTML • Images • Hierarchical Data Format • PDF • DOCX • MP3		CO3
9	Load the Iris dataset as a list of lists a. Compute and print the mean and the standard deviation for each of the 4 measurement columns (i.e.sepal length and width, petal length and width Compute and print the mean and the standard deviation for each of the 4 measurement columns, separately for each of the three Iris species.		CO2

10	a. Find the data distributions using box and scatter plot. b. Find the outliers using box plot c. Plot the histogram, bar chart and pie chart on sample data d. Plot Pie Chart, Histogram (3D) [including colourful ones]	CO5
11	Import a sample dataset and perform Regression techniques to find out relation between variables.	CO2
12	Find the correlation matrix. a. Plot the correlation plot on dataset and visualize giving an overview of relationships among variables on data set. b. Analysis of covariance: variance (ANOVA)if data have categorical variables on data set.	CO2
13	Write a program to create 3D plot, to add title, change viewing direction, add color and shade to the plot.	CO5
14	a. Create a data frame from the sample data set. b. Create a table with the needed variables c. Perform the Chi-Square test.	CO2
15	Perform complete steps of exploratory data analysis on standard data sets (iris flowers, Wine Quality Dataset etc.)	CO4

Lab Course Outcome:

CO 1	Develop basic R programs.	K3
CO 2	Implement statistical techniques on variety of data.	K3
CO 3	Explore different types of data and file formats.	K2
CO 4	Perform exploratory data analysis on different data types.	K3
CO 5	Apply visualization techniques on various data sets.	K3

B. TECH. THIRD YEAR			
Course Code	**ACSBS0652**	**L T P**	**Credit**
Course Title	**COMPUTER NETWORKS LAB**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool	CO1
2	Study of Network Devices in Detail. Study of network IP.	CO1
4	Connect the computers in Local Area Network.	CO2
5	Study of basic network command and Network configuration commands.	CO2
6	Performing an Initial Switch Configuration	CO3
7	Performing an Initial Router Configuration	CO3
8	Configuring and Troubleshooting a Switched Network	CO4
9	Connecting a Switch	CO4
10	Configuring WEP on a Wireless Router	CO5
11	Using the Cisco IOS Show Commands	CO5

Lab Course Outcome:

CO 1	Develop basic Network and Network Devices	K3
CO 2	Implement LAN and network configuration	K3
CO 3	Explore router and switch configuration	K2
CO 4	Perform connection of switch and troubleshooting	K3
CO 5	Apply Cisco IOS	K3

B. TECH. THIRD YEAR			
Course Code	**ACSBS0653**	**L T P**	**Credit**
Course Title	**INFORMATION SECURITY LAB**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Analysis of security in Unix/Linux.	CO1
2	Study of Network Devices in Detail.	CO1
3	Write a program to study a simulation tool related to Information Security.	CO3
4	Study of network IP.	CO3
5	Implement the following Substitution & Transposition Techniques concepts: a) Caesar Cipher b) Rail fence row & Column Transformation.	C04

Lab Course Outcome:

CO 1	Learn analysis of security and network configuration	K1
CO 2	Develop basic Network and Network Devices	K6
CO 3	Understand network IP and study simulation.	K1, K2
CO 4	Implement algorithms based on security.	K3

B. TECH. THIRD YEAR (ELECTIVE III)

Course code	ACSBS0611	L T P	Credits
Course title	ROBOTICS AND EMBEDDED SYSTEMS	3 0 0	3

Course objective:
To acquire knowledge about modern-day robotics and understand computer vision in robotics and apply the concepts of Python, Cloud computing, and computer vision in this future technology.

Pre-requisites: Basic Knowledge of Python, R, and Cloud Computing.

Course Contents / Syllabus

UNIT-I	Introduction to Modern Day Robotics and their industrial applications	8 Hours

Industry 4.0 Concept: Background and Overview-Industry 4.0 technologies: implementation patterns in manufacturing companies-Evolution of Industrial Robots and their Applications-Advancements in Robotics and Its Future Uses-Types of robotics in various fields for applications.

Technologies essential for Cognitive Robotics: Computer systems and Technologies relevant to modern day robotics-Robotic Process Automation: Overview of RPA and its applications-RPA, AI, and Cognitive Technologies for Leaders-Introduction to Robotics: Analysis, Control, Applications

UNIT-II	Introduction to computer vision and application of Vision Systems in Robotics	8 Hours

Concepts of computer vision and the how vision systems are becoming essential part of Robotics-Computer Vision: Models, Learning, and Inference -Mastering Computer Vision with TensorFlow 2.x: Build advanced computer vision applications using machine learning and deep learning techniques- Machine Vision Applications-
Application areas for vision systems-Robot inspection case study-Autonomous driving using 3D imaging case study.

UNIT-III	AI in the context of Cognitive Robotics and Role of AI in Robotics	8 Hours

Foundation for Advanced Robotics and AI- A Concept for a Practical Robot Design Process- Demo to train A Robot Using AI - Deep learning core applications-Deep learning business applications. **Data Science and Big Data in the context of Cognitive Robotics:** Cognitive Technologies: The Next Step Up for Data and Analytics in robotics-Cognitive Deep Learning Technology for Big Data Cognitive Assistant Robots for Reducing Variability in Industrial Human-Robot Activities

Artificial Intelligence and Robotics - The Review of Reliability Factors Related to Industrial Robots -Failure analysis of mature robots in automated production- Data Analytics for Predictive Maintenance of Industrial Robots - Failure Is an Option: How the Severity of Robot Errors Affects Human-Robot Interaction

UNIT-IV	Concepts of Cloud computing, cloud platforms and it applications in Robotics:	8 Hours

Learning Cloud Computing: Core Concepts - Cloud Computing: Private Cloud Platforms -Robot as a Service in Cloud Computing -Cloud Computing Technology and Its Application in Robot Control - A Comprehensive Survey of Recent Trends in Cloud

Robotics Architectures and Applications - Google's cloud robotics and high computing needs of industrial automation and systems-The role of cloud and opensource software in the future of robotics-The Power of Cloud Robotics by Robotics Industry Association

UNIT-V	Basics of Robotic operating System	8 Hours

ROS for beginners an overview- Introduction to the Robot Operating System (ROS) Middleware - Secure communication for the Robot Operating System - An Introduction to Robot Operating System: The Ultimate Robot Application Framework by Adnan Quality of Service and Cybersecurity Communication Protocols -Analysis for the Robot Operating System

Robotics systems communication- Threat modelling using ROS. Introduction to Python and R Programming in the context of Robotics: Introduction to Python - Python Functions for Data Science-Basic ROS Learning Python for robotics- An introduction to R -The R in Robotics ros R: A New Language Extension for the Robot Operating System.
Towards cloud robotic system: A case study of online co-localization for fair resource competence-A Case Study on Model-Based Development of Robotic Systems using Monti Arc with Embedded Automata.

Course outcome: After completion of this course students will be able to:

CO 1	Understand basic concepts and technological advancements in AI and robotics.	K3
CO 2	Develop skills of using advanced software for solving practical problems in robotics pertaining to various industries.	K2
CO 3	Understand and apply several statistical analysis techniques and business analytics for cognitive robotics.	K3
CO4	Understand and apply the programming of robots using python and R languages.	K4
CO 5	Understand and apply the concept of cloud computing in robotics.	K3

Textbooks:

1) Saeed Benjamin Niku, "Introduction to Robotics: Analysis, Control, Applications", Wiley Publishers, 2nd edition,2011.
2) Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 2012.

Reference Books:

1) Francis X. Govers," Artificial Intelligence for Robotics: Build Intelligent Robots that Perform Human Tasks Using AI Techniques", Packt publishing,2018.
2) Krishnendu Kar, "Mastering Computer Vision with TensorFlow 2.x: Build Advanced Computer Vision Applications Using Machine Learning and Deep Learning Techniques", Packt publishing,2020.
3) Armando Vieira, Bernardete Ribeiro," Introduction to Deep Learning Business Applications for Developers from Conversational Bots in Customer Service to Medical Image processing",Apress,2018.

Links:

Unit 1	https://www.youtube.com/watch?v=xrwz9IxpMJg https://www.youtube.com/watch?v=Cndodc3X50s https://www.youtube.com/watch?v=0yD3uBshJB0 https://www.youtube.com/watch?v=8orItG9eYiY https://www.youtube.com/watch?v=t5cQ36JJCdk https://www.youtube.com/watch?v=Zsl7ttA9Kcg
Unit 2	https://www.youtube.com/watch?v=SVcOWYfsBkc https://www.youtube.com/watch?v=qq6--4jtj7s https://www.youtube.com/watch?v=CuTjKzECIaE https://www.youtube.com/watch?v=OVgJPRSET30
Unit 3	https://www.youtube.com/watch?v=yCXm5cgG0UA https://www.youtube.com/watch?v=t5cQ36JJCdk

	https://www.youtube.com/watch?v=U7ofPzjMeqE https://www.youtube.com/watch?v=iaGIo_Viazs&t=543
Unit 4	https://www.youtube.com/watch?v=M988_fsOSWo https://www.youtube.com/watch?v=GneIpdOirZY https://www.youtube.com/watch?v=p2zZ9tZHDMk https://www.youtube.com/watch?v=LYWVF4bGHjs
Unit 5	https://www.youtube.com/watch?v=N6K2LWG2kRI https://www.youtube.com/watch?v=usMzReF8usM https://www.youtube.com/watch?v=96XsJ7xfsS8

B. TECH. THIRD YEAR (ELECTIVE-III)

Course code	ACSBS0612	L T P	Credits
Course title	MODERN WEB APPLICATIONS	3 0 0	3

Course objective:

The objective of this course is to enable students to learn new technologies by applying foundation paradigms. It helps students to develop modern web application by leveraging latest technologies. The course aims to build strong expertise to develop end to end application - web frontend and backend development making students job ready as per industry requirements.

Pre-requisites: Basic Knowledge of programming

Course Contents / Syllabus

UNIT-I	INTRODUCTION	8 Hours

Concept of website, its need and purpose, Types of websites: Static and Dynamic, Introduction to HTML, XML, JSON, Web Browsers, Web Servers, Uniform Resource Locator, Tools and Web Programming Languages, Web Standards, Tiered Architecture: Client Server Model, Three Tier Model, Service Oriented Architectures, REST services.

UNIT-II	CORE TECHNOLOGIES FOR WEB APPS	8 Hours

HTML: Languages used for website development, HTML5: basic tags, formatting tags, Adding images, Lists, Embedding multimedia in Web pages, Inserting tables, Internal and External Linking, Frames, Forms.

CSS: Basics of Cascading Style sheets, Advantages of CSS, External Style sheet, Internal style sheet, Inline style sheet, CSS Syntax, color, background, Font, images

UNIT-III	DYNAMIC BEHAVIOUR WITH JAVA SCRIPT	8 Hours

Features of JavaScript, extension of JavaScript, Syntax of JavaScript: data types, operators, variables, tag, Document Object Model (DOM) with JavaScript, Selection Statement using if and Switch, Iterative statement: for, for/in, while, do while, break and continue.

UNIT-IV	FRONT END FRAMEWORK	8 Hours

Introduction to jQuery - Syntax, Selectors, Events, Traversing, AJAX, Introduction to Bootstrap – Basics, Grids, Themes ; Angular JS – Expressions, Modules, Data Binding, Scopes, Directives & Events, Controllers, Filters, Services, Validation

UNIT-V	BACK-END TECHNOLOGIES	8 Hours

Introduction to RESTful services, Resources, Messages (Request, Response), Addressing, Methods – (GET, POST, PUT, DELETE)

Course outcome: After completion of this course students will be able to:

CO 1	Understand the basic concepts and architecture of web applications	K2
CO 2	Apply and use basic coding in HTML and CSS for responsive web design	K3
CO 3	Build dynamic web applications with support of JavaScript.	K6
CO4	Analyze web applications with front end systems.	K4

CO5	Examine web applications with back end technologies.	K4

Text books:

1) Steven M. Schafer, "HTML, XHTML, and CSS Bible, 5ed", Wiley India 2. Ian Pouncey, Richard York, "Beginning CSS: Cascading Style Sheets for Web Design", Wiley India
2) Ian Pouncey, Richard York, "Beginning CSS: Cascading Style Sheets for Web Design", Wiley India

Reference Books:

1) Joel Sklar , "Principal of web Design" Vikash and Thomas Learning
2) Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech
3) Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication
4) Ramesh Bangia, "Internet and Web Design" , New Age International

Links:

Unit 1	https://www.coursehero.com/file/66643350/Lesson-1-Introduction-to-Web-Application-Develpment-1pdf/ https://www.youtube.com/watch?v=RsQ1tFLwldY
Unit 2	https://www.youtube.com/watch?v=D-h8L5hgW-w
Unit 3	https://www.youtube.com/watch?v=hdI2bqOjy3c
Unit 4	https://www.w3schools.com/angular/angular_intro.asp https://www.youtube.com/watch?v=QhQ4m5g2fhA https://www.youtube.com/watch?v=tNKD0kfel6o
Unit 5	https://www.tutorialspoint.com/restful/restful_quick_guide.htm https://www.youtube.com/watch?v=LooL6_chvN4

B. TECH. THIRD YEAR (ELECTIVE III)

Course code	ACSBS0613	L T P	Credits
Course title	DATA MINING AND ANALYTICS	3 0 0	3

Course objective: Understand basic concepts and techniques of Data Mining. It helps in developing skills of using data mining software for solving practical problems. This can be understood and apply several statistical analysis techniques: regression, ANOVA, data reduction.

Pre-requisites: Basic Knowledge of Data warehousing and Data Mining

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO DATA MINING	8 Hours

Introduction: What is data mining? Related technologies - Machine Learning, DBMS, OLAP, Statistics, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Applications.

UNIT-II	DATA PREPROCESSING	8 Hours

Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies, Installing Weka 3 Data Mining System, Experiments with Weka - filters, discretization.

Data mining knowledge representation: Task relevant data, Background knowledge, Representing input data and output knowledge, Visualization techniques.

Attribute-oriented analysis: Attribute generalization, Attribute relevance, Class comparison, Statistical measures.

UNIT-III	DATA MINING ALGORITHMS	8 Hours

Association rules Motivation and terminology, Example: mining weather data, Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis.

Classification: Basic learning/mining tasks, Inferring rudimentary rules: 1R, algorithm, Decision trees, covering rules.

Prediction: The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), linear models.

UNIT-IV	DESCRIPTIVE ANALYTICS	8 Hours

Data Modeling, Trend Analysis, Simple Linear Regression Analysis.

Forecasting models: Heuristic methods, predictive modeling and pattern discovery, Logistic Regression: Logit transform, ML estimation, Tests of hypotheses, Wald test, LR test, score test, test for overall regression, multiple logistic regression, forward, backward method, interpretation of parameters, relation with categorical data analysis. Interpreting Regression Models, Implementing Predictive Models.

Generalized Linear model: link functions such as Poisson, binomial, inverse binomial, inverse Gaussian, Gamma.

Non-Linear Regression (NLS): Linearization transforms, their uses & limitations, examination of non-linearity, initial estimates, iterative procedures for NLS, grid search, Newton-Raphson, steepest descent, Marquardt's methods. Introduction to semiparametric regression models, additive regression models. Introduction to nonparametric regression methods.

UNIT-V	TIME SERIES ANALYSIS	8 Hours

Auto - Covariance, Auto-correlation, and their properties. Exploratory time series analysis, Test for trend and seasonality, Exponential and moving average smoothing, Holt – Winter smoothing, forecasting based on smoothing.

Linear Time Series Models: Autoregressive, Moving Average, Autoregressive Moving Average and Autoregressive Integrated Moving Average models; Estimation of ARMA models such as Yule-Walker estimation for AR Processes, Maximum likelihood and least-squares estimation for ARMA Processes, Forecasting using ARIMA models.

Prescriptive Analytics: Mathematical optimization, Networks modeling-Multi-objective optimization-Stochastic modeling, Decision and Risk Analysis, Decision trees.

Course outcome: After completion of this course students will be able to:

CO 1	Student will be able to understand data warehouse and design model of data warehouse.	K3
CO 2	Student will be to learned steps of preprocessing.	K2
CO 3	Students will be able to understand the analytical operations on data	K3
CO4	Students will be able to discover patterns and knowledge from data warehouse.	K4
CO 5	Students will be able to understand and implement classical algorithm in data.	K3

Text books:

1. Jiawei Han and Micheline Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Publishers, 3rd ed, 2010.
2. Lior Rokach and Oded Maimon, “Data Mining and Knowledge Discovery Handbook”, Springer, 2nd edition, 2010
3. Box, G.E.P and Jenkins G.M. (1970) Time Series Analysis, Forecasting and Control, Holden-Day.

Reference Books:

1. Draper, N. R. and Smith, H. (1998). Applied Regression Analysis (John Wiley) Third Edition.

Hosmer, D. W. and Lemeshow, S. (1989). Applied Logistic Regression (Wiley).

Links:

Unit 1	https://www.youtube.com/watch?time_continue=4&v=IZZA_gajkLY&feature=emb_logo
Unit 2	https://www.youtube.com/watch?v=L8ZJajcQzew
Unit 3	https://www.youtube.com/watch?v=WPgslzdr60g
Unit 4	https://www.youtube.com/watch?v=mgxYPYRneyk
Unit 5	https://www.youtube.com/watch?v=ZQN2ehPcGx5c

Home Assignments:	
1	**Experiments with Weka** – Visualization Techniques, using filters and statistics, mining association rules, decision trees rules, Prediction
2	**Mining real data:** Preprocessing data from a real domain (Medical/ Retail/ Banking); Applying various data mining techniques to create a comprehensive and accurate model of the data
3	**Analytics Assignment 1:** Conduct and Present a summary report on an End-to-end statistical model building exercise using sample data – Data preprocessing, Descriptive Analysis (Exploratory Data Analysis), Hypothesis building, Model Fitting, Model Validation and Interpretation of results
4	**Analytics Assignment 2:** Build statistical models using any two linear and non-linear regression techniques: Simple Linear Regression; Multiple Regression; Variable Selection Problem; Multicollinearity and Ridge Regression; Nonlinear regression; non-parametric regression; Logistic regression (binary and multiple); Poisson/Negative binomial regression (Use sample data sets)

B. TECH. THIRD YEAR (ELECTIVE IV)

Course code	ACSBS0614	L T P	Credits
Course title	ENTERPRISE SYSTEMS	3 0 0	3

Course objective:

The objective of this course is to understand the fundamental concepts of Various ERP Modules, CRM Modules and to enhance the knowledge of Web Applications using MVC and Network Security and its Configuration.

Pre-requisites: Basic Knowledge of Statistics and Probability

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO MVC	8 Hours

Overview of Database Management Systems, Overview of Model - View - Control (MVC), Control (MVC) method of software development in a 3 tier environment, Control (MVC) development in a 3 tier environment, Tools and Technologies, Brief overview of the following: Java server pages, Related Java Technologies, Microsoft .NET framework, PHP, Ruby on Rails, Javascript, Ajax.,

UNIT-II	ERP SYSTEMS	8 Hours

Service Oriented Architecture (SOA), Principles of loose coupling, encapsulation, Inter-operatibility, Web Services as the implementation vehicle protocols, usage, ERP systems and their Architecture, Overview of SAP and ORACLE Applications, Generic ERP Modules: Finance, HR, Materials Management, Investment etc., Examples of Domain specific Modules

UNIT-III	CRM MODELS AND COTS	8 Hours

Electronic Data Exchange, Customer Relationship Management (CRM), Supplier Relationship Management (SRM), Software Acquisition Process, Tendering; conditions of contract, Commercial off the shelf software (COTS) versus Bespoke Implementations; Total cost of ownership, Issues on using Open-source software or free software, Issues on using Open-source software or free software

UNIT-IV	NETWORK SECURITY	8 Hours

Security Issues: Authentication, Authorization, Access Control, Roles; single-sign-on, Directory servers, Audit trails; Digital Signatures; Encryption: Review of IP Sec, SSL and other Technologies; simple applications demo, Overview of: MPLS, Virtual Private Networks (VPN), Firewalls, Network monitoring and enforcement of policies

UNIT-V	CONFIGURATION OF NETWORKING	8 Hours

Hardware Architectures for Enterprise Systems, Servers, Clustering, Storage area networks, Storage units, Back-up strategies, Local Area Network (LAN) technologies and products, Data Centres, Disaster recovery site design and implementation issues, Hardware Acquisition Issues

Course outcome: After completion of this course students will be able to:

CO 1	Design and deploy Simple Web Applications using MVC	K1
CO 2	Design SOA and ERP models.	K2

CO 3	Design of CRM models	K3
CO4	Design interactive network and application	K4
CO 5	Manage, Maintain and configuration of Networking	K5

Text books:

1) Enterprise Resource Planning - Alexis Leon, Tata McGraw Hill.
2) Enterprise Resource Planning – Diversified by Alexis Leon, TMH.

Reference Books:

1) Enterprise Resource Planning - Ravi Shankar & S. Jaiswal , Galgotia.
2) E-Business Network Resource planning using SAP R/3 Baan and Peoplesoft : A Practical Roadmap For Success By Dr. Ravi Kalakota
3) Enterprise Resource Planning - Ravi Shankar & S. Jaiswal , Galgotia.
4) E-Business Network Resource planning using SAP R/3 Baan and Peoplesoft : A Practical Roadmap For Success By Dr. Ravi Kalakota

Links:

Unit 1	https://www.youtube.com/watch?v=0vS0gvxll44
Unit 2	https://www.youtube.com/watch?v=jNiEMmoTDoE https://www.youtube.com/watch?v=aAzNVxEae2M
Unit 3	https://www.youtube.com/watch?v=SEIp-Gfgf1g https://www.youtube.com/watch?v=T3cpQio764U https://www.youtube.com/watch?v=LTJgqheRmyo
Unit 4	https://www.youtube.com/watch?v=6Jubl1UnJTE https://www.youtube.com/watch?v=JoeiLuFNBc4&list=PLBlnK6fEyqRgJU3EsOYDTW7m6SUmW6kII
Unit 5	https://www.youtube.com/watch?v=L2p3yMhKLa0

B. TECH THIRD YEAR (ELECTIVE-IV)

Course Code	ACSBS0615	L T P	Credit
Course Title	ADVANCE FINANCE	3 0 0	3

Course Objective: The objective of this course is to help students to develop in-depth knowledge about the financial techniques and instruments, imbibe knowledge about the decisions and decision variables involved with financial activities of the firm, develop skills for interpretation business information and application of financial theory in corporate investment decisions, with special emphasis on working capital management.

Prerequisites: Student must have basic understanding of financial Accounting**.**

Course Contents / Syllabus

UNIT-I	Sources of Funds	8 Hours

Types of securities, Issuing the capital in market, Pricing of issue, Valuation of Stocks and bonds, Traditional Approach, Dividend Relevance Model, Miller and Modigliani Model, Stability of Dividends, Forms of Dividends, Issue of bonus shares, Stock Split

UNIT-II	Corporate Restructuring	8 Hours

\Mergers and Acquisitions- Types of Mergers, Evaluation of Merger Proposal ,Take-over, Amalgamation ,Leverage buy-out, Management buy-out ,Corporate Failure and Liquidation , Evaluation of Lease Contracts

UNIT-III	Financial Restructuring	8 Hours

Share Split, Consolidation , Cancellation of Paid-up Capital, Other Mechanisms

UNIT-IV	Working Capital Management	8 Hours

Working Capital Planning, Monitoring and Control of Working Capital, Working Capital Financing. Managing the Components of Working Capital, Cash Management, Receivable Management, Inventory Management.

UNIT-V	Introduction to derivatives	8 Hours

Basics of Futures, Forwards, Options, Swaps, Interest rate Payoff Diagrams, Pricing of Futures, Put Call Parity, Option Pricing using Binomial Model and Black Scholes Model, Use of Derivatives for Risk-Return Management-Credit Default Swaps.

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

CO 1	Develop in-depth knowledge about the financial techniques and instruments.	K2, K1
CO 2	Imbibe knowledge about the decisions and decision variables involved with financial activities of the firm.	K 3
CO 3	Develop skills for interpretation business information and application of financial theory in corporate investment decisions, with special emphasis on working capital management.	K2, K4

CO 4	Familiarizing the students with the corporate and financial restructuring.	K2, K5
CO 5	Familiarizing the students with the derivatives concept.	K2

Text books

1. Brealey, Myers and Allen, *Principles of Corporate Finance*

Case Study Materials: To be distributed for class discussion.

Reference Books

1 Richard Brealey and Stewart Myers. - Principles of Corporate Finance (SIE 14th Edition), 2022 McGraw Hill.
2. Jaffe and Westerfield- " Corporate Finance" (SIE,13th Ed), 2022, McGraw Hill.
3 Aswath Damodaran.- " Corporate Finance Theory and Practice", 10e WileyPLUS
4. Working Capital Management by R.P. Rustagi reprint 2021

B. TECH. THIRD YEAR (ELECTIVE IV)

Course code	ACSBS0616	L T P	Credits
Course title	IMAGE PROCESSING AND PATTERN RECOGNITION	3 0 0	3

Course objective: The objective of this course is to get adequate knowledge about image processing and pattern recognition. It helps students to acquire practical knowledge about image processing and pattern recognition tools. It will provide students the necessary knowledge to design and implement a prototype of an image processing and pattern recognition applications.

Pre-requisites:

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO IMAGE PROCESSING & IMAGE FORMATION	8 Hours

Image processing systems and its applications, Basic image file formats, Geometric and photometric models; Digitization - sampling, quantization; Image definition, its representation and neighbourhood metrics.

UNIT-II	INTENSITY TRANSFORMATIONS & SPATIAL FILTERING	8 Hours

Enhancement, contrast stretching, histogram specification, local contrast enhancement; Smoothing, linear and order statistic filtering, sharpening, spatial convolution, Gaussian smoothing, DoG, LoG.

UNIT-III	IMAGE SEGMENTATION & IMAGE/OBJECT FEATURES EXTRACTION	8 Hours

Pixel classification; Grey level thresholding, global/local thresholding; Optimum thresholding - Bayes analysis, Otsu method; Derivative based edge detection operators, edge detection/linking, Canny edge detector; Region growing, split/merge techniques, line detection, Hough transform, Textural features - gray level co-occurrence matrix; Moments; Connected component analysis; Convex hull; Distance transform, medial axis transform, skeletonization/thinning, shape properties.

UNIT-IV	IMAGE REGISTRATION	8 Hours

Mono-modal/multimodal image registration; Global/local registration; Transform and similarity measures for registration; Intensity/pixel interpolation.

UNIT-V	COLOUR IMAGE PROCESSING & MORPHOLOGICAL FILTERING BASICS	8 Hours

Fundamentals of different colour models - RGB, CMY, HSI, YCbCr, Lab; False colour; Pseudo colour; Enhancement; Segmentation, Dilation and Erosion Operators, Top Hat Filters

Course outcome: After completion of this course students will be able to:

CO 1	Understanding the concept of image processing and its techniques.	K3
CO 2	Explain and exemplify spatial filtering and intensity transformation.	K2
CO 3	Performing Image Segmentation and understanding image/object features extraction techniques.	K3
CO4	Analyze different image registration types.	K4

CO 5	Illustrate color image processing techniques and doing morphological filtering.	K3
Text books:		
3) *Digital Image Processing.* R. C. Gonzalez and R. E. Woods, Prentice Hall.		
Reference Books:		
5) *Image Processing: The Fundamentals.* Maria Petrou and Panagiota Bosdogianni, John Wiley & Sons, Ltd.		
6) *Digital Image Processing.* K. R. Castleman:, Prentice Hall, Englewood Cliffs.		
7) *Visual Reconstruction.* A. Blake and A. Zisserman, MIT Press, Cambridge.		
Links:		
Unit 1	https://www.youtube.com/watch?v=Y_-HgmvF9Zc https://www.youtube.com/watch?v=MiSS_aEEf8w	
Unit 2	https://www.youtube.com/watch?v=F3ZvWQMyj4I	
Unit 3	https://www.youtube.com/watch?v=onWJQY5oFhs	
Unit 4	https://www.youtube.com/watch?v=ecu8kreTwYM	
Unit 5	https://www.youtube.com/watch?v=7ImSbCj8bRI https://www.youtube.com/watch?v=yKFaHFwTg00	

B. TECH. THIRD YEAR (ELECTIVE III)			
Course Code	**ACSBS0611P**	**L T P**	**Credit**
Course Title	**ROBOTICS AND EMBEDDED SYSTEMS LAB**	**0 0 2**	**1**
List of Experiments:			
Sr. No.	**Name of Experiment**		**CO**
1	To study an introduction of the robot configuration.		CO1
2	To study and implement the basic concept of RPA with one simulation.		CO1
3	To study and apply the computer vision with tensor flow.		CO2
4	To study and apply the autonomous driving .		CO2
5	To demonstrate the training of a robot using AI.		CO3
6	To demonstrate the usage of the industrial robotics.		CO3
7	To demonstrate and apply the cloud computing in robotics.		CO4
8	To demonstrate and apply the google cloud robotics .		CO4
9	To demonstrate robot with 2 dof, 3 dof, 4 dof		CO5
10	Two assignments on programming the robot for applications		CO5
11	To implement the modern based development of robotic systems.		CO5
12	To explore and apply the basic commands of ROS using Python.		CO5
Lab Course Outcome:	After the completion of the lab the students are able to :		
CO 1	Understand the basic concepts of RPA and robotic configuration.		K3
CO 2	Develop the skills of using the advance software for autonomous driving.		K4
CO 3	To be able to apply the concept of the industrial robotics.		K3
CO 4	Develop and apply the concept of the cloud computing in robotics.		K3
CO 5	Evaluate and examine the concept of ROS .		K5

B. TECH. THIRD YEAR (ELECTIVE-III)			
Course code	**ACSBS0612P**	**L T P**	**Credit**
Course title	**MODERN WEB APPLICATIONS LAB**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Draft a survey document of ten websites which you like and dislike with various reasons.	CO1
2	Implement Basic Html Tags Implement Table Tags Implement Frames	CO2
3	Create your profile page i.e. educational details, Hobbies, Achievement, My Ideals etc	CO2
4	Design the following static web pages required for an online book store web site. a) HOME PAGE: The static home page must contain three frames. b) LOGIN PAGE c) CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table. d) REGISTRATION PAGE	CO2
5	Develop and demonstrate the usage of inline, internal and external style sheet using CSS	CO2
6	Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next in the list. Add CSS to customize the properties of the font of the capital (color,bold and font size).	CO2
7	Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient	CO3
8	Write JavaScript to validate the following fields of the Registration page. a) First Name (Name should contains alphabets and the length should not be less than 6 characters). b) Password (Password should not be less than 6 characters length). c) E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com) d) Mobile Number (Phone number should contain 10 digits only). e) Last Name and Address (should not be Empty).	CO3
9	Write a JavaScript code that displays text “TEXT-GROWING” with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays “TEXT-SHRINKING” in BLUE color. Then the font size decreases to 5pt.	CO3

10	Develop and demonstrate a HTML file that includes JavaScript script that uses functions for the following problems: a) Parameter: A string Output: The position in the string of the left-most vowel b) Parameter: A number Output: The number with its digits in the reverse order	CO3
11	Using JQuery Implement: a) Selecting Element, Getting Values, Setting Values. b) Events	CO4
12	Using Angular JS Implement: a) Input Validation b) Backend Building	CO4
13	Write a backend application program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings, current time of server.	CO5
14	Write a backend application program to sort the student records which are stored in the database using selection sort.	CO5
15	Write the backend application to do the following: a) Implement simple calculator operations. b) Find the transpose of a matrix. c) Multiplication of two matrices. d) Addition of two matrices	CO5

Lab Course Outcome:

CO 1	Understand the basic concepts of websites, their types, web pages.	K2
CO 2	Implement web pages on HTML and CSS	K3
CO 3	Demonstrate dynamic behaviour of applications with Javascript	K2
CO 4	Design the web applications using front end technologies	K6
CO 5	Analyze and design the web applications using back end technologies	K4, K6

B. TECH. THIRD YEAR (ELECTIVE III)			
Course Code	**ACSBS0613P**	**L T P**	**Credit**
Course Title	**DATA MINING AND ANALYTICS LAB**	**0 0 2**	**1**
List of Experiments:			
Sr. No.	**Name of Experiment**		**CO**
1	Build Data Warehouse and Explore WEKA.		CO1
2	Perform data preprocessing tasks and demonstrate performing association rule mining on data sets.		CO1
3	Demonstrate performing classification on data sets.		CO1
4	Demonstrate performing clustering on data sets.		CO2
5	Demonstrate performing Regression on data sets.		CO2
6	Task 1: Credit Risk Assessment. Sample Programs using German Credit Data.		CO2
7	Task 2: Sample Programs using Hospital Management System.		CO3
8	Demonstrate performing on preprocessing data from a real domain (Medical/ Retail/ Banking).		CO3
9	Demonstrate performing on applying various data mining techniques to create a comprehensive and accurate model of the data.		CO3
10	Demonstrate performing on visualization Techniques using filters and statistics, mining association rules, decision trees rules, Prediction		CO2
Lab Course Outcome:			
CO 1	Understand the implementation procedures for Data mining operations.		K2
CO 2	Analyze different programming concept.		K4
CO 3	Solve and classification on WEKA data-set on different algorithm.		K3
CO 4	Understand the clustering on different algorithm.		K2
CO 5	Design apriori algorithm for various data set.		K6

B. TECH. THIRD YEAR (CSBS- ELECTIVE IV)			
Course Code	**ACSBS0614P**	**L T P**	**Credit**
Course Title	**ENTERPRISE SYSTEMS LAB**	**0 0 2**	**1**
List of Experiments:			
Sr. No.	Name of Experiment		CO
1	Create a Movie Database Application using MVC		CO1
2	Creating an ASP.NET MVC Web Application Project.		CO1
3	Creating an ASP.NET MVC Web Application Project.		CO1
4	Explore the client/server architecture of SAP. Learn how to use the user interface.		CO2
5	Create customer, material master data. Execute the Sales process in SAP.		CO2
6	Create vendor, material master data for purchasing.. Execute the Purchasing process in SAP.		CO2
7	A model of customer relationship management and business intelligence systems for catalogue and online retailers.		CO3
8	A model of customer relationship management and business intelligence systems for catalogue and online retailers.		CO3
9	Work on case study.		CO3
10	Firewalls configuration		CO4
11	COTS configuration and Implementation		CO4
12	Work on case study on NETWORK SECURITY and Manage, Maintain and configuration of Networking		CO4,CO5
Lab Course Outcome:			
CO 1	Develop web based application using MVC		K3
CO 2	Implement different ERP modules		K3
CO 3	Explore different types of CRM models		K2
CO 4	Perform cryptographic concept		K3
CO 5	Apply network security technologies		K3

B. TECH. THIRD YEAR (CSBS- ELECTIVE IV)			
Course Code	**ACSBS0615P**	**L T P**	**Credit**
Course Title	**ADVANCE FINANCE LAB**	**0 0 2**	**1**
List of Experiments:			
Sr. No.	Name of Experiment		CO
1	Practical of Miller and Modigliani Model		**CO1**
2	Activity on Mergers and Acquisitions		**CO2**
3	Share Split		**CO3**
4	Evaluation of Working Capital		**CO4**
5	Use of Derivatives for Risk-Return Management		**CO5**
Lab Course Outcome:			
CO 1	Develop in-depth knowledge about the financial techniques and instruments.		K2, K1
CO 2	Imbibe knowledge about the decisions and decision variables involved with financial activities of the firm.		K 3
CO 3	Develop skills for interpretation business information and application of financial theory in corporate investment decisions, with special emphasis on working capital management.		K2, K4
CO 4	Familiarizing the students with the corporate and financial restructuring.		K2, K5
CO 5	Familiarizing the students with the derivatives concept.		K2

B. TECH. THIRD YEAR (ELECTIVE IV)

Course code	ACSBS0616P	L T P	Credits
Course title	IMAGE PROCESSING AND PATTERN RECOGNITION LAB	0 0 2	1

List of Experiments:

Sr. No.	Name of Experiment	CO
1.	**Lab1:** To create a program to display grayscale image using read and write operation. **Lab2:** To create a vision program to find histogram value and display histograph of a grayscale and color image.	CO1
2.	**Lab3:** To create a vision program for Non-Linear Filtering technique using edge detection **Lab 4:** To create a vision program to determine the edge detection of an image using different operators.	CO2
3.	**Lab5:** To create a program to discretize an image using Fourier transformation. **Lab6:** To create a program to eliminate the high frequency components of an image.	CO1
4.	**Lab7:** To create a color image and perform read and write operation **Lab8:** To obtain the R, B, G colour values and resolved colour values from a colour box by choosing any colour. **Lab9:** To create a program performs discrete wavelet transform on image.	CO1
5.	**Lab10:** To create a program for segmentation of an image using watershed transforms. **Lab 11:** Implementation of image restoring techniques. **Lab 12:** Implementation of Image Intensity. **Lab 13:** Program to perform morphological operations: erosion and dilation	CO2

Lab Course Outcome: After completion of this course students will be able to

CO1	Gain all round knowledge of image processing techniques.	K2
CO2	Analyze and implement Image edge detection technique and pattern recognition techniques.	K4, K5