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

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
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	ACSE0501	Design and Analysis of Algorithms	3	1	0	30	20	50		100		150	4
2	ACSE0503	Design Thinking-II	2	1	0	30	20	50		100		150	3
3	ACSE0505	Web Technology	3	0	0	30	20	50		100		150	3
4	ACSE0506	Database Management System	3	1	0	30	20	50		100		150	4
5		Departmental Elective –I	3	0	0	30	20	50		100		150	3
6		Departmental Elective –II	3	0	0	30	20	50		100		150	3
7	ACSE0551	Design and Analysis of Algorithms Lab	0	0	2				25		25	50	1
8	ACSE0555	Web Technology Lab	0	0	2				25		25	50	1
9	ACSE0556	Database Management System Lab	0	0	2				25		25	50	1
10	ACSE0559	Internship Assessment	0	0	2				50			50	1
11	ANC0501/ ANC0502	Constitution of India, Law and Engineering / Essence of Indian Traditional Knowledge	2	0	0	30	20	50		50		100	
12		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										**1100**	**24**

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	AMC0094	Reliable Google Cloud Infrastructure: Design and Process	Google	8	0.5
2	AMC0095	The Bits and Bytes of Computer Networking	Google	25	2

PLEASE NOTE: -

- **Internship (3-4 weeks) shall be conducted during summer break after semester-IV and will be assessed during Semester-V**
- **Compulsory Audit Courses (Non Credit - ANC0501/ANC0502)**
  - 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	Bucket Name	Branch	Semester
1	Elective-I	ACSAI0511	Cloud Storage Management	Cloud and Big Data	CS	5
2	Elective-II	ACSAI0520	Cloud Virtualization		CS	5
3	Elective-I	ACSE0511	CRM Fundamentals	CRM-RPA	CS	5
4	Elective-II	ACSE0513	CRM Administration		CS	5
5	Elective-I	ACSAI0512	Data Analytics	Data Analytics	CS	5
6	Elective-II	ACSAI0519	Business Intelligence and Data Visualization		CS	5
7	Elective-I	ACSE0512	Python Web Development with Django	Full Stack Development	CS	5
8	Elective-II	ACSE0514	Design Patterns		CS	5

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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	ACSML0601	Machine Learning	3	0	0	30	20	50		100		150	3
2	ACSE0602	Computer Networks	3	1	0	30	20	50		100		150	4
3	ACSE0603	Software Engineering	3	0	0	30	20	50		100		150	3
4		Departmental Elective -III	3	0	0	30	20	50		100		150	3
5		Departmental Elective -IV	3	0	0	30	20	50		100		150	3
6		Open Elective -I	3	0	0	30	20	50		100		150	3
7	ACSML0651	Machine Learning Lab	0	0	2				25		25	50	1
8	ACSE0652	Computer Networks Lab	0	0	2				25		25	50	1
9	ACSE0653	Software Engineering Lab	0	0	2				25		25	50	1
10	ACSE0659	Mini Project	0	0	2				50			50	1
11	ANC0602 / ANC0601	Essence of Indian Traditional Knowledge / Constitution of India, Law and Engineering	2	0	0	30	20	50		50		100	
12		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										**1100**	**23**

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	AMC0124	Networking in Google Cloud: Defining and Implementing Networks	Google	10	0.5
2	AMC0125	Networking in Google Cloud: Hybrid Connectivity and Network Management	Google	10	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 - ANC0601/ANC0602)**
  - 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	Bucket Name	Branch	Semester
1	Elective-III	ACSAI0615	DevOps on Cloud	Cloud and Big Data	CS	6
2	Elective-IV	ACSAI0621	Big Data		CS	6
3	Elective-III	ACSE0611	CRM Development	CRM-RPA	CS	6
4	Elective-IV	ACSE0613	Robotics Process Automation(RPA)		CS	6
5	Elective-III	ACSAI0617	Programming for Data Analytics	Data Analytics	CS	6
6	Elective-IV	ACSAI0622	Social Media Analytics		CS	6
7	Elective-III	ACSAI0612	Advanced Java Programming	Full Stack Development	CS	6
8	Elective-IV	ACSE0614	Web Development using MEAN Stack		CS	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	ACSE0501	L T P	Credits
Course Title	DESIGN AND ANALYSIS OF ALGORITHMS	3 1 0	4

Course objective: Analyze asymptotic performance of algorithms designed using different computational model. Study advanced data structures like Red black Tree, binomial and Fibonacci heap and learn the concept of complexity classes.

Pre-requisites: Basic knowledge of any programming language like C/C++/ Python/Java, Data Structures, Discrete Structures and Graph Theory

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

Algorithms, Analyzing Algorithms, Complexity of Algorithms, Amortized Analysis, Growth of Functions, Methods of solving Recurrences, Performance Measurements, Sorting and Order Statistics –Insertion Sort, Shell Sort, Heap Sort, Priority queue, Comparison of Sorting Algorithms, Sorting in Linear Time, Counting Sort, Radix Sort.

UNIT-II	Advanced Data Structures	8 Hours

Red-Black Trees, B – Trees, Binomial Heaps, Fibonacci Heaps.

UNIT-III	Divide and Conquer and Greedy Methods	8 Hours

Divide and Conquer concepts with Examples Such as Quick sort, Merge sort, Strassen's Matrix Multiplication, Convex Hull, Searching. Greedy Methods with Examples Such as Activity Selection, Task scheduling, Knapsack, Minimum Spanning Trees – Prim's and Kruskal's Algorithms, Single Source Shortest Paths - Dijkstra's and Bellman Ford Algorithms, Huffman codes.

UNIT-IV	Dynamic Programming, Backtracking, Branch and Bound	8 Hours

Dynamic Programming concepts, Examples Such as All Pair Shortest Paths – Warshal's and Floyd's Algorithms, 0/1 Knapsack, Longest Common Sub Sequence, Matrix Chain Multiplication, Resource Allocation Problem. Graph searching (BFS, DFS), Backtracking, Branch and Bound with Examples Such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of Subsets.

UNIT-V	Selected Topics	8 Hours

String Matching Algorithms such as Rabin-karp Matcher, Finite Automaton Matcher, KMP Matcher, Boyer Moore Matcher. Theory of NP-Completeness, Approximation Algorithms and Randomized Algorithms.

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

CO 1	Analyze the asymptotic performance of algorithms and write rigorous correctness proofs for algorithms.	K4
CO 2	Use efficient data structures such as RB tree, B tree, binomial and Fibonacci heaps etc. according to the problem	K3
CO 3	Apply divide and conquer and greedy algorithm approach for solving different problems such	K5
CO 4	Apply important algorithmic design paradigms and methods of analysis such as dynamic programming, backtracking, branch and bound.	K5

CO 5	Demonstrate tractable and intractable problems and the classes P, NP and NP-complete problems. And also use Algorithms for solving string matching problem.	K3
Text books:		
1) Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.		
2) E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms".		
3) Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2008.		
4) LEE "Design & Analysis of Algorithms (POD)", McGraw Hill.		
Reference Books:		
1. Richard E.Neapolitan "Foundations of Algorithms" Jones & Bartlett Learning.		
2. Jon Kleinberg and ÉvaTardos, Algorithm Design, Pearson, 2005.		
3. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.		
4. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997		
5. Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.		
NPTEL/ Youtube/ Faculty Video Link:		
Unit 1	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0 https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/EVALUATION_SCHEME_3RD YEAR AI.docx	
Unit 2	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0 https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/	
Unit 3	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0 https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/	
Unit 4	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0 https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/	
Unit 5	https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O https://www.youtube.com/watch?v=aGjL7YXI31Q&list=PLEbnTDJUr_IeHYw_sfBOJ6gk5pie0yP-0	

	https://nptel.ac.in/courses/106/106/106106131/ https://nptel.ac.in/courses/106/101/106101060/

B. TECH THIRD YEAR

Course code	ACSE0503	L T P	Credits
Course title	DESIGN THINKING-II	2 1 0	3

Course Objectives: The objective of this course is to upgrade Design Thinking skills by learning & applying advanced and contextual Design Thinking Tools. It aims to solve a Real-Life Problem by applying Design Thinking to create an impact for all the stakeholders

Pre-requisites: Student must complete Design Thinking-I course.

Course Contents / Syllabus

UNIT-I	INTRODUCTION	10 HOURS

Design thinking & Innovation, Design Thinking Mindset and Principles, recap of 5-Step Process of Design Thinking, Design Approaches, additional in-depth examples of each design approaches. Simon Sinek's – Start with Why, The Golden Circle , Asking the "Why" behind each example (an in-class activity of asking 5-WHYS) , The Higher Purpose, in-class activity for LDO & sharing insights

Visualization and it's importance in design thinking , reflections on wheel of life (in-class activity for visualization & Wheel of Life), Linking it with Balancing Priorities (in class activity), DBS Singapore and Bank of Americas' Keep the Change Campaign. Litter of Light & Arvind Eye Care Examples, understanding practical application of design thinking tools and concepts, case study on McDonald's Milkshake / Amazon India's Rural Ecommerce & Gillette

Working on 1-hour Design problem, Applying RCA and Brainstorm on innovative solutions.

Main project allocation and expectations from the project.

UNIT-II	REFINEMENT AND PROTOTYPING	8 HOURS

Refine and narrow down to the best idea, 10-100-1000gm, QBL, Design Tools for Convergence – SWOT Analysis for 1000gm discussion. In-class activity for 10-100-1000gm & QBL

Prototyping (Convergence): Prototyping mindset, tools for prototyping – Sketching, paper models, pseudo-codes, physical mockups, Interaction flows, storyboards, acting/role-playing etc, importance of garnering user feedback for revisiting Brainstormed ideas.

Napkin Pitch, Usability, Minimum Viable Prototype, Connecting Prototype with 3 Laws, A/B Testing, Learning Launch. Decision Making Tools and Approaches – Vroom Yetton Matrix, Shift-Left, Up, Right, Value Proposition, Case study: Careerbuddy, You-Me-Health Story & IBM Learning Launch.
In-class activities on prototyping- paper-pen / physical prototype/ digital prototype of project's 1000gm idea.

UNIT-III	STORYTELLING, TESTING AND ASSESSMENT	8 HOURS

Storytelling: Elements of storytelling, Mapping personas with storytelling, Art of influencing, Elevator Pitch, Successful Campaigns of well-known examples, in-class activity on storytelling. 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.
Final Project Presentation and assessing the impact of using design thinking

UNIT-IV	INNOVATION, QUALITY AND LEADERSHIP	6 HOURS

Innovation: Need & Importance, Principles of innovations, Asking the Right Questions for innovation, Rationale for innovation, Quality: Principles & Philosophies, Customer perception on quality, Kaizen, 6 Sigma. FinTech case study of Design Thinking application – CANVAS

Leadership, types, qualities and traits of leaders and leadership styles, Leaders vs Manager, Personas of Leaders & Managers, Connecting Leaders-Managers with 13 Musical Notes, Trait theory, LSM (Leadership Situational Model), Team Building Models: Tuckman's and Belbin's. Importance of Spatial elements for innovation.

UNIT-V	UNDERSTANDING HUMAN DESIRABILITY	8 HOURS

Comprehensive human goal: the five dimensions of human endeavour (Manaviya - Vyavstha) are: Education- Right living (Sikhsa- Sanskar), Health – Self-regulation (Swasthya - Sanyam), Justice – Preservation (Nyaya- Suraksha), Production – Work (Utpadan – Karya), Exchange – Storage (Vinimya – Kosh), Darshan-Gyan-Charitra (Shifting the Thinking)

Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature, Thinking expansion for harmony: Self-exploration (Johari's window), group behaviour, interpersonal behaviour and skills, Myers-Briggs personality types (MBTI), FIRO-B test to repair relationships.

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

CO 1	Learn sophisticated design tools to sharpen their problem-solving skills	K2
CO 2	Construct innovate ideas using design thinking tools and converge to feasible idea for breakthrough solution	K6
CO 3	Implement storytelling for persuasive articulation	K3
CO 4	Understanding the nature of leadership empowerment	K2
CO 5	Understand the role of a human being in ensuring harmony in society and nature.	K2

Textbooks:

1. Arun Jain, UnMukt : Science & Art of Design Thinking, 2020, Polaris
2. Gavin Ambrose and Paul Harris, Basics Design 08: Design Thinking, 2010, AVA Publishing SA
3. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, First Edition, 2009, Excel Books: New Delhi

Reference Books:

1. Jeanne Liedta, Andrew King and Kevin Benett , Solving Problems with Design Thinking – Ten Stories of What Works, 2013, Columbia Business School Publishing.
2. Dr Ritu Soryan, Universal Human Values and Professional Ethics, 2022, Katson Books.
3. Vijay Kumar, 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization, 2013, John Wiley and Sons Inc, New Jersey.
4. Roger L. Martin, Design of Business: Why Design Thinking is the Next Competitive Advantage, 2009, Harvard Business Press, Boston MA.
5. Tim Brown, Change by Design, 2009, Harper Collins.
6. Pavan Soni, Design your Thinking : The Mindsets, Toolsets and Skill Sets for Creative Problem-Solving, 2020, Penguin Books.

Links: NPTEL/ YouTube/ Web Link

Unit I https://www.youtube.com/watch?v=6_mHCOAAEI8

https://nptel.ac.in/courses/110106124

https://designthinking.ideo.com/

https://blog.experiencepoint.com/how-mcdonalds-evolved-with-design-thinking

Unit II https://www.coursera.org/lecture/uva-darden-design-thinking-innovation/the-ibm-story-iq0kE

https://www.coursera.org/lecture/uva-darden-design-thinking-innovation/the-meyouhealth-story-part-i-what-is-W6tTs

https://onlinecourses.nptel.ac.in/noc19_mg60/preview

Unit III https://nptel.ac.in/courses/109/104/109104109/

https://www.d-thinking.com/2021/07/01/how-to-use-storytelling-in-design-thinking/

Unit IV https://www.worldofinsights.co/2020/10/infographic-8-design-thinking-skills-for-leadership-development/

Unit V https://www.youtube.com/watch?v=hFGVcx1Us5Y

B. TECH THIRD YEAR

Course Code	ACSE0505	L T P	Credits
Course Title	WEB TECHNOLOGY	3 0 0	3

Course objective: This course covers different aspect of web technology such as HTML, CSS, Java Script and provide fundamental concepts of Internet, Web Technology and Web Programming**.** Students will be able to build a proper responsive website.

Pre-requisites: Basic Knowledge of any programming language like C/C++/Python/Java. Familiarity with basic concepts of Internet.

Course Contents / Syllabus

UNIT-I	Basics of Web Technology & Testing	8 Hours

History of Web and Internet, connecting to Internet, Introduction to Internet services and tools, Client-Server Computing, Protocols Governing Web, Basic principles involved in developing a web site, Planning process, Types of Websites, Web Standards and W3C recommendations, Web Hosting Basics, Types of Hosting Packages, Introduction to Web testing, Functional Testing,
Usability & Visual Testing, Performance & Load Testing.

UNIT-II	Introduction to HTML & XML	8 Hours

HTML, DOM- Introduction to Document Object Model, Basic structure of an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, Understand the structure of HTML tables. Lists, working with Hyperlinks, Image Handling, Understanding Frames and their needs, HTML forms for User inputs. New form Elements- date, number, range, email, search and data list, Understanding audio, video and article tags XML Syntax, Elements, Attributes, Namespaces, Display, HTTP request, Parser, DOM, XPath, XSLT, XQuery, XLink, Validator, DTD and XML Schema.

UNIT-III	Concepts of CSS3 & Bootstrap	8 Hours

Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS-Id and Class, Box Model (Introduction, JavaScript Border properties, Padding Properties, Margin properties) CSS Advanced (Grouping, Dimension, Display, Positioning,

Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color, Creating page Layout and Site. Bootstrap Features & Bootstrap grid system, Bootstrap Components, Bootstrap Plug-Ins.

UNIT-IV	JavaScript and ES6	8 Hours

Introduction to Java Script, Javascript Types, Var, Let and Const Keywords, Operators in JS, Conditional Statements, Java Script Loops, JS Popup Boxes JS Events, JS Arrays, Working with Arrays, JS Objects, JS Functions Validation of Forms, Arrow functions and default arguments, Template Strings, Strings methods, Callback functions, Object de-structuring, Spread and Rest Operator, Typescript fundamentals, Typescript OOPs- Classes, Interfaces, Constructor etc. Decorator and Spread Operator, Asynchronous Programming in ES6, Promise Constructor, Promise with Chain, Promise Race.

UNIT-V	Introduction to PHP	8 Hours

Basic Syntax of PHP, Variables & Constants, Data Type, Operator & Expressions, Control flow and Decision making statements, Functions, Strings, Arrays, understanding file& directory, Opening and closing, a file, Copying, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading &Downloading. Introduction to Session Control, Session Functionality What is a Cookie, Setting Cookies with PHP. Using Cookies with Sessions, Deleting Cookies, Registering Session variables, Destroying the variables and Session.

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

CO 1	Identify the basic facts and explaining the basic ideas of Web technology and internet.	K1, K2
CO 2	Applying and creating various HTML5 semantic elements and application with working on HTML forms for user input.	K3, K6
CO 3	UnderstandingandapplyingtheconceptsofCreatingStyleSheetCSS3 and bootstrap.	K2, K3
CO 4	Analysing and implementing concept of JavaScript and its applications.	K4, K6
CO 5	Creating and evaluating dynamic web pages using the concept of PHP.	K5, K6

Text books:

1. C Xavier, "Web Technology and Design", 1nd Edition 2003, New Age International.
2. Raj Kamal, "Internet and Web Technologies", 2nd Edition 2017,Mc Graw Hill Education.
3. Oluwafemi Alofe, "Beginning PHP Laravel",2nd Edition 2020, kindle Publication.

Reference Books:

1. Burdman, Jessica, "Collaborative Web Development" 5th Edition 1999, Addison Wesley Publication.
2. Randy Connolly, "Fundamentals of Web Development",3rd Edition 2016,
3. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", 4th Edition 2010 BPB Publication

NPTEL/ YouTube/Faculty Video Link:

Unit1	https://youtu.be/96xF9phMsWA https://youtu.be/Zopo5C79m2k https://youtu.be/ZliIs7jHi1s https://youtu.be/htbY9-yggB0
Unit2	https://youtu.be/vHmUVQKXlVo https://youtu.be/qz0aGYrrlhU https://youtu.be/BsDoLVMnmZs https://youtu.be/a8W952NBZUE
Unit 3	https://youtu.be/1Rs2ND1ryYc https://youtu.be/vpAJ0s5S2t0 https://youtu.be/GBOK1-nvdU4 https://youtu.be/Eu7G0jV0ImY
Unit 4	https://youtu.be/-qfEOE4vtxE https://youtu.be/PkZNo7MFNFg https://youtu.be/W6NZfCO5SIk https://youtu.be/DqaTKBU9TZk
Unit 5	https://youtu.be/_GMEqhUyyFM https://youtu.be/ImtZ5yENzgE https://youtu.be/xIApzP4mWyA https://youtu.be/qKR5V9rdht0

B. TECH. THIRD YEAR

Course Code	ACSE0506	L T P	Credit
Course Title	DATABASE MANAGEMENT SYSTEM	3 1 0	4

Course objective:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information in relational and non-relation Database.

Pre-requisites: The student should have basic knowledge of discrete mathematics and data structures.

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

Overview, Database system Vs File system, Database system concepts, architecture and structures, data model schema and instances, Data independence and Database language and Interfaces, DDL, DML.

Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, Candidate key, Primary key, Generalization, Aggregation, Reduction of an ER diagrams to tables, Extended ER model, Relationship of higher degree.

UNIT-II	Relational Data Model and Language	8 Hours

Relational data model Concepts, Integrity constraints, Entity integrity, Referential integrity, Keys constraints, Domain constraints, Relational algebra, Relational calculus, Tuple and Domain calculus.

Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, Views and indexes. Queries and sub queries. Aggregate functions. Insert, Update and Delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL.

UNIT-III	Database Design-Normalization	8 Hours

Normalization, Normal Form (NF), Functional Dependencies (FD), Closure of an attribute set and FD sets, Canonical Cover of FD Sets, Normal Forms based on Functional Dependencies (1 NF, 2 NF, 3 NF, BCNF), Multivalued Dependencies (MVDs) and 4NF, Join Dependencies (JDs) and 5NF and Domain Key Normal Formal (DKNF or 6NF), Inclusion Dependencies, Loss-Less Join Decompositions.

UNIT-IV	Transaction Processing and Recovery Concept	8 Hours

Transaction system, Testing of serializability, Serializability of schedules, Conflict &View serializable schedule, Recoverability, Recovery from transaction failures, Log based recovery, Checkpoints, Deadlock handling.

Control Concurrency Techniques: Concurrency Control, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, Validation-based protocol, Multiple granularity, Multi version schemes, Recovery with concurrent transaction, Case study of Oracle.

Distributed Database: -Introduction Distributed Database, Centralized and Distributed System Database System.

UNIT-V	Introduction No-SQL with cloud Database	8 Hours

Definition of NoSQL, History of NoSQL and Different NoSQL products, Exploring Mongo DB, Interfacing and Interacting with NoSQL, NoSQL Storage Architecture, CRUD operations with MongoDB, Querying, Modifying and Managing NoSQL Data stores, Indexing and ordering datasets(MongoDB).

Cloud database: - Introduction of Cloud database, NoSQL with Cloud Database, Introduction to Real time Database.

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

CO 1	Analyze database used to solve real world and complex problem and design the ER, EER Model.	K4
CO 2	Analyze and apply Structured Query Language (SQL) or Procedural Query Language (PL/SQL) to solve the complex queries. Implement relational model, integrity constraints.	K4,K3
CO 3	Design and implement database for storing, managing data efficiently by applying the Normalization process on the database.	K6
CO 4	Synthesize the concepts of transaction management, concurrency control and recovery.	K5
CO 5	Understand and implement the concepts of NoSQL with cloud database.	K2, K5

Text books:

1) Korth, Silbertz, Sudarshan," Database System Concepts", Seventh Edition, McGraw - Hill.
2) Elmasri, Navathe, " Fundamentals of Database Systems", Seventh Edition, Addision Wesley.
3) Ivan Bayross "SQL,PL/SQL The programming language Oracle, Forth Edition, BPB Publication.

Reference Books:

1) Thomas Cannolly and Carolyn Begg, "Database Systems: A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
2) Raghu Ramakrishan and Johannes Gehrke "Database Management Systems" Third Edition, McGraw-Hill.
3) NoSQL and SQL Data Modeling: Bringing Together Data, Semantics, and Software First Edition by Ted Hills.
4) Brad Dayley "NoSQL with MongoDB in 24 Hours" First Edition, Sams Publisher.

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=TlbJk78TqYY http://www.nptelvideos.com/lecture.php?id=6472 http://www.nptelvideos.com/lecture.php?id=6473
Unit 2	http://www.nptelvideos.com/lecture.php?id=6474 http://www.nptelvideos.com/lecture.php?id=6475 http://www.nptelvideos.com/lecture.php?id=6476 http://www.nptelvideos.com/lecture.php?id=6477 http://www.nptelvideos.com/lecture.php?id=6478 http://www.nptelvideos.com/lecture.php?id=6479 http://www.nptelvideos.com/lecture.php?id=6480 http://www.nptelvideos.com/lecture.php?id=6481
Unit 3	http://www.nptelvideos.com/lecture.php?id=6484 http://www.nptelvideos.com/lecture.php?id=6485 http://www.nptelvideos.com/lecture.php?id=6486 http://www.nptelvideos.com/lecture.php?id=6487 http://www.nptelvideos.com/lecture.php?id=6493 http://www.nptelvideos.com/lecture.php?id=6495 http://www.nptelvideos.com/lecture.php?id=6496 http://www.nptelvideos.com/lecture.php?id=6497
Unit 4	http://www.nptelvideos.com/lecture.php?id=6499 http://www.nptelvideos.com/lecture.php?id=6500 http://www.nptelvideos.com/lecture.php?id=6501 http://www.nptelvideos.com/lecture.php?id=6502 http://www.nptelvideos.com/lecture.php?id=6503 http://www.nptelvideos.com/lecture.php?id=6504

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Unit 5	http://www.nptelvideos.com/lecture.php?id=6516 http://www.nptelvideos.com/lecture.php?id=6517 http://www.nptelvideos.com/lecture.php?id=6518 http://www.nptelvideos.com/lecture.php?id=6519 https://www.youtube.com/watch?v=2yQ9TGFpDuM

B. TECH THIRD YEAR

Course Code	ACSE0551	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	**ACSE0555**	**L T P**	**Credit**
Course Title	**WEB TECHNOLOGY LAB**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1.	Write HTML program to display your CV in navigator, your Institute website, Department Website and Tutorial website for specific subject.	CO2
2.	Write a program in XML for creation of DTD, which specifies set of rules. Create a style sheet in CSS/ XSL & display the document in internet explorer.	CO2
3.	Write a program to show the use of XML Schema.	CO2
4.	Write a CSS program to show use of Inline, Internal and External CSS.	CO3
5.	Write a program for CSS Box Model.	CO3
6.	Write a program to show the use of Bootstrap components and Grid System	CO3
7.	Write HTML program to design Registration form and Validate it using JavaScript.	CO1,CO 4
8.	Write JavaScript program to show the use of Dialogue Boxes i.e. Alert, Confirm and Prompt Boxes.	CO4
9.	Write a program to show various types of JavaScript Events.	CO4
10.	Write a program in PHP to find the factorial of given number.	CO5
11.	Write a program in PHP to perform file handling.	CO5
12.	Write a PHP program to show the use of Session & Cookies.	CO5

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

CO 1	Implementing the concepts and creating pages of HTML	K3
CO 2	Implementing the concepts and creating HTML and XML pages.	K3, K6
CO 3	Implementing the concepts of CSS and Bootstrap and Creation of various types of style sheets.	K3, K6
CO 4	Implementing JavaScript and creating Client Side Pages with functionalities.	K3, K6
CO 5	Implementing the concepts of PHP and creating Server Side Pages.	K3, K6

B. TECH. THIRD YEAR

Course Code	ACSE0556	L TP	Credit
Course Title	DATABASE MANAGEMENT SYSTEM LAB	0 0 2	1

List of Experiments:

Sr. No.	Name of Experiment	CO
1.	Installing ORACLE/ MYSQL/NOSQL.	CO1
2.	Creating Entity-Relationship Diagram using case tools with Identifying (entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc.)	CO1
3.	I. Implement DDL commands –Create, Alter, Drop etc. II. Implement DML commands- Insert, Select, Update, Delete	CO2
4.	I. Implement DCL commands-Grant and Revoke II. Implement TCL commands- Rollback, Commit, Save point III. Implement different type key: -Primary Key, Foreign Key and Unique etc.	CO2
5.	Converting ER Model to Relational Model (Represent entities and relationships in Tabular form, Represent attributes as columns, identifying keys).	CO1, CO2
6.	Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping.	CO2
7.	Practicing Queries using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, CONSTRAINTS etc.	CO2
8.	Practicing Sub queries (Nested, Correlated) and Joins (Inner, Outer and Equi).	CO2
9.	**Practicing on Triggers** - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger	CO4
10.	**Procedures**- Creation of Stored Procedures, Execution of Procedure, and Modification of Procedure	CO4
11.	**Cursors**- Declaring Cursor, Opening Cursor, Fetching the data, closing the cursor.	CO4
12.	Study of Open Source NOSQL Database: MongoDB (Installation, Basic CRUD operations, Execution)	CO5
13.	Design and Develop Mongo DB Queries using CRUD operations. (Use CRUD operations, SAVE method, logical operators)	CO5
14.	Implement aggregation and indexing with suitable example using MongoDB.	CO5
15.	Mini project (Design & Development of Data and Application) for following: - a) Inventory Control System. b) Material Requirement Processing. c) Hospital Management System. d) Railway Reservation System. e) Personal Information System. f) Web Based User Identification System. g) Timetable Management System. h) Hotel Management System	CO1

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

CO 1	Design and implement the ER, EER model to solve the real-world problem and transform an information model into a relational database schema and to use a data.	K6
CO 2	Formulate and evaluate query using SQL solutions to a broad range of query and data update problems.	K6
CO 3	Apply and create PL/SQL blocks, procedure functions, packages and triggers, cursors.	K3, K6

CO 4	Analyze entity integrity, referential integrity, key constraints, and domain constraints on database.	K4
CO5	Demonstrate understanding of MongoDB and its query operations.	K3

B. TECH. THIRD YEAR (ELECTIVE-I)

Course code	ACSAI0511	L T P	Credits
Course title	CLOUD STORAGE MANAGEMENT	3 0 0	3

Course objective: The course intends to introduce students to the fundamentals of cloud storage applications and services, specifically private clouds such as AWS, AZURE, and Google. Students would be able to appreciate the fundamentals and core of cloud storage also understand and design virtual storage solutions for various needs and analyze the role of technology in the design of a storage solution in a cloud architecture.

Pre-requisites: Adequate knowledge of Basics of Cloud Computing and its architecture covered through courses prior to this semester.

Course Contents / Syllabus

UNIT-I	INTRODUCTION	8 Hours

Importance of data storage - Business issues and IT challenges - Business and IT opportunities opportunity for Cloud, Virtualization and Data Storage Networking - Server and Storage I/O Fundamentals - I/O connectivity and Networking Fundamentals - IT Clouds - Virtualization - Virtualization and Storage Services - Data and Storage Access.

UNIT-II	CLOUD INFRASTRUCTURE AND STORAGE	8 Hours

Managing Data Infrastructures for Cloud and Virtual Environments, Being Secure without Being Scared - Eliminating Blind Spots, Gaps in Coverage, or Dark Territories - Security Threat Risks Challenges - Taking Action to resources - Securing Networks- Securing Storage - Virtual Servers, Physical Servers, and Desktops - Security Clouds - Disposing of Digital Assets and Technology - Security Checklist.

UNIT-III	CLOUD STORAGE SOLUTIONS	8 Hours

Tiered Storage - Storage Reliability - Availability - Serviceability (RAS) - Storage Services and Functionalities - Storage System Architectures - Storage Virtualization and Virtual Storage, Cloud storage, Types of storage in cloud, AWS: S3, EBS, EFS FSx. Google Cloud Storage: Persistent Disk, Filestore, Cloud Storage, Archival storage. Hybrid cloud storage: AWS storage gateway.

UNIT-IV	CLOUD INFRASTRUCTURE AND MIGRATION SOLUTIONS	8 Hours

Data Movement and Migration, IaaS migration, PaaS Migration, SaaS migration, VM migration, Migration solutions, AWS: Snow family, DataSync, Transfer family. Google cloud migration, Database Migration Services (DMS).

UNIT-V	MIGRATION CASE STUDY	8 Hours

Case Study 1: The company struggled with the maintenance difficulties and lack of scalability of the bare metal infrastructure supporting their operations.

Case Study 2: Analyse the benefits with data of a company that has switched its computing solutions to cloud.

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

CO 1	Understand the basics of data storage, Virtualization and storage services	K2

CO 2	Analyze the infrastructures for Cloud storage	K6
CO 3	Evaluate the storage solutions	K3
CO4	Understand cloud migration solutions	K4
CO 5	Analyze cloud migration solutions on different needs	K5

Textbooks:

1) AWS Docs.

Links:

UNIT-I	s07/slides/cse497b-lecture-26-virtualmachine.pdf
UNIT-II	https://docs.aws.amazon.com/Security
UNIT-III	https://aws.amazon.com/what-is-cloud-storage/ https://docs.aws.amazon.com/S3
UNIT-IV	**Error! Hyperlink reference not valid.**www.ibm.com/in-en/cloud/learn/iaas-paas-saas
UNIT-V	https://aws.amazon.com/cloud-migration/ https://docs.aws.amazon.com/migrationhub/?id=docs_gateway

B. TECH. THIRD YEAR (ELECTIVE-II)

Course code	ACSAI0520	L T P	Credits
Course title	CLOUD VIRTUALIZATION	3 0 0	3

Course objective: The course intends to introduce students to the fundamentals of developing application on Cloud, specifically public clouds such as AWS, AZURE and Google.

Pre-requisites: Adequate knowledge of Basics of Cloud Computing and its architecture covered through courses prior to this semester.

Course Contents / Syllabus

UNIT-I	CLOUD AND VIRTUALIZATION	8 Hours

Virtual Machines and Virtualization of Clusters Virtualization Structures/Tools and Mechanisms and Data Centers, Implementation Levels of Virtualization, Virtualization of CPU, Memory, and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Centre Automation.

UNIT-II	VIRTUALIZATION ARCHITECTURE	8 Hours

Architecture over Virtualized Data Centers, Cloud Computing and Service Models, Data-Centre Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms: GAB, AWS, and Azure, Inter-cloud Resource Management, Cloud Security and Trust Management.

UNIT-III	AWS VIRTUAL INFRASTRUCTURE	8 Hours

Building Virtual Infrastructure consisting of Servers and Networking, Using Virtual Servers: EC2, Programming your Infrastructure: The Command-Line Interface, SDKs, AWS CloudFormation, Automating Deployment: CloudFormation, Elastic Beanstalk, OPSWORKS, Securing your System: IAM, Security Groups, VPC.

UNIT-IV	CLOUD STORAGE AND MIGRATION SOLUTIONS	8 Hours

Storing data in the cloud, storing your objects: S3 and Glacier, Securing your System: IAM, Security Groups, VPC, Storing your Data on Hard Drives: EBS and Instance Store, Using Relational Database Service: RDS, Programming for NoSQL DataBase Service: DynamoDB.

UNIT-V	CLOUD SECURITY & VIRTUALIZED SOLUTIONS	8 Hours

Federation in the Cloud, Presence in the Cloud, Privacy and Its Relation to Cloud-Based Information Systems, Cloud Security Challenges, Software-as-a-Service Security, architecting on AWS, Achieving high Availability: Availability Zones, Auto-Scaling, CloudWatch, DeCoupling your Infrastructure: ELB and SQS, Designing for Fault-Tolerance, Scaling Up and Down: Auto-Scaling and Cloudwatch.

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

CO 1	Understand the fundamentals and core of Virtualization	K2
CO 2	Create Virtual Machines (VM) and compute instances of various configurations.	K6
CO 3	Develop virtual private connection using various network virtualization techniques	K3

CO4	Understand and analyze virtual storage solutions for various usage.	K4
CO 5	Analyze cloud security solutions and monitoring tools to evaluate the performance of cloud resources.	K5

Textbooks:

1) Distributed and Cloud Computing: From Parallel Processing to the Internet of Things Geoffrey C. Fox, Jack Dongarra, and Kai Hwang.

2) Amazon Web Services in Action , Michael Wittig and Andreas Wittig

Reference Books:

1) 'Cloud Computing' by Shailendra Singh ; Oxford higher education 2022

Links:

UNIT-I	https://acloud.guru/ https://nptel.ac.in/courses/106105167
UNIT-II	https://aws.amazon.com/ https://nptel.ac.in/courses/106105223
UNIT-III	https://docs.aws.amazon.com/vpc https://docs.aws.amazon.com/ElasticBeanstalk https://docs.aws.amazon.com/EC2
UNIT-IV	https://docs.aws.amazon.com/S3
UNIT-V	https://docs.aws.amazon.com/Security https://docs.aws.amazon.com/CloudWatch

B. TECH THIRD YEAR (ELECTIVE-I)

Course Code	ACSE0511	L T P	Credits
Course Title	CRM FUNDAMENTALS	3 0 0	3

Course objective: This course is designed to help in understanding the fundamentals of CRM. It will help in providing better services for Sales, Marketing and Customer Relations in an Enterprise. To make the students understand the organizational need, benefits and process of creating long-term value for individual customers. To disseminate knowledge regarding the concept of e-CRM and e-CRM technologies. To enable the students understand the technological and human issues relating to implementation of Customer Relationship Management in the organizations.

Pre-requisites: None

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

CRM- definition, history, goals. Sources of CRM value. Components of CRM: people, process, technology. Evolution of CRM: marketing and its principles, customer relations to CRM. Dynamics of Customer Supplier Relationships, Nature and context of CRM, Strategy and Organization of CRM: strategy, The relationship-oriented organization: Mission, Culture, Structure, People, Communication & Information Systems.

UNIT-II	CRM Strategy and Framework	8 Hours

Developing a CRM strategy. Customer oriented (C in CRM), Relationship driven, 360 degree view of customer.
CRM system features- functions, application, benefits and solutions. Importance of loyalty- active, passive, split, shifting and switchers, customer profiling, customer segmentation model, Customer Experience, relationship marketing and journey, Case study.

UNIT-III	Solution Design and Architecture	8 Hours

CRM system solution- specifications. Data Analysis, Solution Requirements. Types of CRM- On-Premise, cloud based. Pros and Cons of each. Integration CRM with other enterprise applications.
The Technology of CRM: Data warehouses and customer relationships, creating data mart model, components of operational data warehouse.

UNIT-IV	CRM for Business	8 Hours

CRM in Sales, Service, Marketing, E-commerce. Social Customer Relationship Management. Analytical CRM: Predictive Analytics Vs Operational Analytics. Channel Partner Relationship management, Collaborative CRM (using data pooling), Business Benefits of Cloud Based System, SLAs, Practical Challenges.

UNIT-V	CRM implementation	8 Hours

Building CRM roadmaps: current processes, customers, strategic goals, technology issues, pilot and proof of concept projects. Preliminary Roadmap and its template, developing roadmap midstream. Design stage, custom development, integration, reporting, data migration, and implementation, testing, launching and application management. Introduction to following CRM tools: ZOHO, Pega, Microsoft Dynamics 365, Sales force.

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

CO 1	Understand the basic concepts of Customer relationship management.	K1, K2
CO 2	To understand strategy and framework of Customer relationship management.	K2
CO 3	Learn basics of Cloud Based Customer relationship management.	K1

CO 4	Understand Customer relationship management in context with business use cases.	K2, K3
CO 5	Understand implementation basics of CRM.	K2, K3

Text books:

1. CRM Fundamentals by Scott Kostojohn Mathew Johnson Brian Paulen. Apress, 2011.
2. Customer Relationship Management- How to develop and execute a CRM strategy By Michael Pearce, Business Expert Press, 2021.

Reference Books:

1. The CRM Handbook-A Business Guide to Customer Relationship Management by Jill Dyché; Addison-Wesley (for case studies)
2. Customer Relationship Management Systems handbook by Duane E Sharp. AUERBACH PUBLICATIONS by CRC Press Company

NPTEL/ YouTube/ Faculty Video Link:

https://onlinecourses.nptel.ac.in/noc20_mg57/preview
https://archive.nptel.ac.in/courses/110/105/110105145/

B. TECH THIRD YEAR (ELECTIVE-II)

Course Code	ACSE0513	L T P	Credits
Course Title	CRM ADMINISTRATION	3 0 0	3

Course objective: This course focus on to understand the concept of Sales force, and the concepts of Sales force App which familiarize with the concepts administration to understand the concepts of Admin Essentials in Lightning Experience

Pre-requisites: Creative thinking and which is being used by the creative talent in your business areas.

Course Contents / Syllabus

UNIT I	Introduction	8 Hours

Sales force Platform Basics, User Management, Data Modelling ,Data Management, Identity Basic , Data Security ,Lightning Experience Customization, Lightning APP Builder Sales force Mobile App Customization, User Engagement , Formulas and Validation, Data Security, Picklist Administration.

UNIT II	Lightning & Salesforce App Experience Customization	8 Hours

Formula and Validation, Accounts and Contacts for Lightning Experience, Lead and Opportunity for Lightning Experience, Product Quotes and Contracts, Campaign Basic.

UNIT III	Salesforce Administration	8 Hours

Service Cloud for lightning Experience, Sales force mobile app customization, AppExchange basic Duplicate Management Lightning Experience for Sales force Classic Users, Chatter Administration for Lightning Experience, Reports and Dashboards for lightning experience, Lightning experience customization, Lightning experience rollout , Sales force flow, Lightning experience report dashboard Specialist.

UNIT IV	Lightning Experience	8 Hours

Prepare Your Sales force Org for Users, Customize an Org to Support a New Business Unit, Protect Your Data in Sales force, Customize a Sales Path for Your Team, Customize a Sales force Object, Import and Export with Data Management Tools.

UNIT V	Learn Admin Essentials in Lightning Experience	8 Hours

Create Reports and Dashboards for Sales and Marketing Managers, Improve Data Quality for Your Sales and Support Teams, Create a Process for Managing Support Cases, User Engagement, Business Administration Specialist.

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

CO1	Understand the basic working environment of Sales force	K1, K2
CO2	Understand the concepts of Lightning & Sales force App Experience Customization	K1, K2
CO3	Familiarize with concepts reports chatter administration	K3
CO4	Understand the concepts of Lightning Experience	K1, K2
CO5	Learn Admin Essentials in Lightning Experience	K1, K3

Text Books:

1. Alok Kumar Rai : Customer Relationship Management : Concepts and Cases(Second Edition), PHI Learning, 2018
2. Bhasin- Customer Relationship Management (Wiley Dreamtech) ,2019
3. Sales force for beginners by ShaarifSahaalane book by Amazon (Online edition)

Reference Books:

1. Sales force Essentials for Administrators , By ShrivasthavaMohith, Edition Ist ,2018
2. Sales force : A quick Study laminated Reference Guide by Christopher Mathew Spencer eBook by Amazon (Online)
3. Mastering Sales force CRM Administration By Gupta Rakesh Edition IInd 2018
NPTEL/YouTube/Faculty Video Link:
www. Trailhead.salesforce.com
www.mindmajix.com/salesforce-tutorial
www,youtube.com/watch?v=7K42geizQCI

B. TECH THIRD YEAR (ELECTIVE-I)

Course Code	ACSAI0512	L T P	Credits
Course Title	DATA ANALYTICS	3 0 0	3

Course objective: The objective of this course is to understand the fundamental concepts of Data analytics and learn about various types of data formats and their manipulations. It helps students to learn exploratory data analysis and visualization techniques in addition to R/Python/Tableau programming language.

Pre-requisites: Basic Knowledge of Statistics and Probability.

Course Contents / Syllabus

UNIT-I | Introduction To Data Science | 8 Hours

Introduction to Data Science, Big Data, the 5 V's, Evolution of Data Science, Datafication, Skillsets needed, Data Science Lifecycle, types of Data Analysis, Data Science Tools and technologies, Need for Data Science, Analysis Vs Analytics Vs Reporting, Big Data Ecosystem, Future of Data Science, Applications of Data Science in various fields, Use cases of Data science-Facebook, Netflix, Amazon, Uber, AirBnB.

UNIT-II | Data Handling | 8 Hours

Types of Data: structured, semi-structured, unstructured data, Numeric, Categorical, Graphical, High Dimensional Data, Transactional Data, Spatial Data, Social Network Data, standard datasets, Data Classification, Sources of Data, Data manipulation in various formats, for example, CSV file, pdf file, XML file, HTML file, text file, JSON, image files etc. import and export data in R/Python.

UNIT-III | Data Pre-processing | 8 Hours

Form of Data Pre-processing, data Attribute and its types, understanding and extracting useful variables,KDD process, Data Cleaning: Missing Values, Noisy Data, Discretization and Concept hierarchy generation (Binning, Clustering, Histogram), Inconsistent Data, Data Integration and Transformation. Data Reduction: Data Cube Aggregation, Data Compression, Numerosity Reduction.

UNIT-IV | Exploratory Data Analysis | 8 Hours

Handling Missing data, Removing Redundant variables, variable Selection, identifying outliers, Removing Outliers, Time series Analysis, Data transformation and dimensionality reduction techniques such as Principal Component Analysis (PCA), Factor Analysis (FA) and Linear Discriminant Analysis (LDA), Univariate and Multivariate Exploratory Data Analysis. Data Munging, Data Wrangling- APIs and other tools for scrapping data from the web/ internet using R/Python.

UNIT-V | Data Visualization | 8 Hours

Introductions and overview, Debug and troubleshoot installation and configuration of the Tableau. Creating Your First visualization: Getting started with Tableau Software, Using Data file formats, connecting your Data to Tableau, creating basic charts (line, bar charts, Tree maps), Using the Show me panel.

Tableau Calculations: Overview of SUM, AVR, and Aggregate features Creating custom calculations and fields, Applying new data calculations to your visualization.

Manipulating Data in Tableau: Cleaning-up the data with the Data Interpreter, structuring your data, Sorting, and filtering Tableau data, Pivoting Tableau data.

Advanced Visualization Tools: Using Filters, Using the Detail panel Using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colours, Creating Dashboards & Stories, Distributing & Publishing Your Visualization

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

CO 1	Understand the fundamental concepts of data analytics in the areas that plays major role within the realm of data science.	K1
CO 2	Explain and exemplify the most common forms of data and its representations.	K2
CO 3	Understand and apply data pre-processing techniques.	K3
CO4	Analyse data using exploratory data analysis.	K4
CO 5	Illustrate various visualization methods for different types of data sets and application scenarios.	K3

Text books:

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

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

Reference Books:

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

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

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

Links:

Unit 1	https://www.youtube.com/playlist?list=PL15FRvx6P0OWTlNBS_93NHG2hIn9cynVT
Unit 2	https://www.youtube.com/playlist?list=PLLy_2iUCG87DxxkLX4Pc3wCvsF1yAvz0T
Unit 3	https://www.youtube.com/watch?v=lhO3fBiMDag
Unit 4	https://www.youtube.com/watch?v=q4pyaVZjqk0
Unit 5	https://www.youtube.com/playlist?list=PLWPirh4EWFpGXTBu8ldLZGJCUeTMBpJFK

B. TECH THIRD YEAR (ELECTIVE-II)

Course code	ACSAI0519	L T P	Credits
Course title	BUSINESS INTELLIGENCE AND DATA VISUALIZATION	3 0 0	3

Course objective: This course covers fundamental concepts of Business Intelligence tools, techniques, components and its future. As well as a bit more formal understanding of data visualization concepts and techniques. The underlying theme in the course is feature of Tableau, its capabilities.

Pre-requisites: Basic Knowledge of Business intelligence.

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO BUSINESS INTELLIGENCE	8 HOURS

Business Intelligence (BI), Scope of BI solutions and their fitting into existing infrastructure, BI Components and architecture, BI Components, Future of Business Intelligence, Functional areas of BI tools, End user assumptions, setting up data for BI, Data warehouse, OLAP and advanced analytics, Supporting the requirements of senior executives including performance management, Glossary of terms and their definitions specific to the field of BI and BI systems.

UNIT-II	ELEMENTS OF BUSINESS INTELLIGENCE SOLUTIONS	8 HOURS

Business Query and Reporting, Reporting, Dashboards and Scorecards Development, Development, Scorecards, Metadata models, Automated Tasks and Events, Mobile Business Intelligence, Software development kit (SDK). Stages of Business Intelligence Projects, Project Tasks, Risk Management and Mitigation, Cost justifying BI solutions and measuring success, BI Design and Development, Building Reports, Building a Report, Drill-up, Drill-down Capabilities.

UNIT-III	TABLEAU	8 HOURS

Introductions and overview: What Tableau can and cannot do well, Debug and troubleshoot installation and configuration of the software.

Creating Your First visualization: Getting started with Tableau Software, Using Data file formats, connecting your Data to Tableau, creating basic charts (line, bar charts, Tree maps), Using the Show me panel

Tableau Calculations: Overview of SUM, AVR, and Aggregate features Creating custom calculations and fields, Applying new data calculations to your visualization.

Formatting Visualizations: Formatting Tools and Menus, formatting specific parts of the view, Editing and Formatting Axes.

UNIT-IV	DATA VISUALIZATION	8 HOURS

Manipulating Data in Tableau: Cleaning-up the data with the Data Interpreter, structuring your data, Sorting, and filtering Tableau data, Pivoting Tableau data.

Advanced Visualization Tools: Using Filters, Using the Detail panel Using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colours.

Creating Dashboards & Stories: Using Storytelling, creating your first dashboard and Story, Design for different displays, Adding interactivity to your Dashboard

Distributing & Publishing Your Visualization: Tableau file types, Publishing to Tableau Online, sharing your visualization, Printing, and exporting.

Given a case study: Perform Interactive Data Visualization with Tableau

UNIT-V	INTRODUCTION TO POWER BI	8 HOURS

Describe the Power BI ecosystem, Define Power BI and its relationship with Excel, Discuss the Power BI suite of products, Describe how the Power BI products integrate, Explain the typical analytics process flow, Differentiate between the various data sources, Connect Power BI to a data source, Clean and transform data to ensure data quality, Load the data to the Power BI Data Model, Describe the Power BI ecosystem, Define Power BI and its relationship with Excel, Discuss the Power BI suite of products, Describe how the Power BI products integrate, Explain the typical analytics process flow.

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

CO 1	Apply quantitative modelling and data analysis techniques to the solution of real-world business problems	K2
CO 2	Understand the importance of data visualization and the design and use of many visual components	K2
CO 3	Understand as products integrate defining various analytical process flow.	K2
CO 4	Learn the basics of troubleshooting and creating charts using various formatting tools.	K4
CO 5	Learn basics of structuring data and creating dashboard stories adding interactivity dashboard stories.	K6

Textbooks:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.
2. Learning Tableau 10 - Second Edition: Business Intelligence and data visualization that brings your business into focus" by Joshua N. Milligan
3. Tableau Your Data! - "Daniel G. Murray and the Inter Works BI Team"-Wiley

Reference Books:

1. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
2. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager"s Guide", Second Edition, 2012.

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	Introduction to Business Intelligence - YouTube
Unit 2	Business Intelligence Tutorial - YouTube
Unit 3	What Is Power BI? | Introduction To Microsoft Power BI | Power BI Training | Edureka - YouTube
Unit 4	https://www.tableau.com/academic/students

B. TECH THIRD YEAR (ELECTIVE-I)

Course Code	ACSE0512	L T P	Credits
Course Title	PYTHON WEB DEVELOPMENT WITH DJANGO	3 0 0	3

Course objective: This course focuses on how to design and build static as well as dynamic webpages and interactive web based applications. These courses mainly focus how Python operates within web development using the increasingly popular Django framework.

Pre-requisites: Students should have good knowledge of Python Programming and Python coding experience.

Course Contents / Syllabus

UNIT-I	Python libraries for web development	8 Hours

Collections-Container datatypes, Tkinter-GUI applications, Requests-HTTP requests, BeautifulSoup4-web scraping, Scrapy, Zappa, Dash, CherryPy, Turbo Gears, Flask, Web2Py, Bottle, Falcon, Cubic Web, Quixote, Pyramid.

UNIT-II	Introduction to Django Framework	8 Hours

Understanding Django environment, Features of Django and Django architecture, MVC and MTV, Urls and Views, Mapping the views to URLs, Django Template, Template inheritance Django Models, Creating model for site, Converting the model into a table, Fields in Models, Integrating Bootstrap into Django, Creating tables, Creating grids, Creating carousels.

UNIT-III	Integrating Accounts & Authentication on Django	8 Hours

Introduction to Django Authentication System, Security Problem & Solution with Django Creating Registration Form using Django, Adding Email Field in Forms, Configuring email settings, Sending emails with Django, Adding Grid Layout On Registration Page, Adding Page Restrictions, Login Functionality Test and Logout.

UNIT-IV	Connecting SQLite with Django	8 Hours

Database Migrations, Fetch Data From Database, Displaying Data On Templates, Adding Condition On Data, Sending data from url to view, Sending data from view to template, Saving objects into database, Sorting objects, Filtering objects, Deleting objects, Difference between session and cookie, Creating sessions and cookies in Django.

UNIT-V	Deploying Django Web Application on Cloud	8 Hours

Creating a functional website in Django, Four Important Pillars to Deploy, registering on Heroku and GitHub, Push project from Local System to GitHub, Working with Django Heroku, Working with Static Root, Handling WSGI with gunicorn, Setting up Database & adding users.

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

CO 1	Apply the knowledge of python programing that are vital in understanding Django application and analyze the concepts, principles and methods in current client-side technology to implement Django application over the web.	K3,K6
CO 2	Demonstrate web application framework i.e. Django to design and implement typical dynamic web pages and interactive web based applications.	K3, K6
CO 3	Implementing and analyzing the concept of Integrating Accounts & Authentication on Django.	K3, K4
CO 4	Understand the impact of web designing by database connectivity with SQLite in the current market place where everyone uses to prefer electronic medium for shoping, commerce, and even social life also.	K2, K3
CO 5	Analyzing and creating a functional website in Django and deploy Django Web Application on Cloud.	K3, K6

Text books:

1. Martin C. Brown, “Python: The Complete Reference Paperback”, 4th Edition 2018, McGraw Hill Education Publication.
2. Reema Thareja, “Python Programming: Using Problem Solving Approach”, 3rd Edition 2017, Oxford University Press Publication.
3. Daniel Rubio, Apress,” Beginning Django Web Application Development and Deployment with Python”, 2nd Edition 2017, Apress Publication.
4. William Jordon, “Python Django Web Development: The Ultimate Django web framework guide for Beginners”, 2nd Edition 2019, Kindle Edition.

Reference Books:

1. Tom Aratyn, “Building Django 2.0 Web Applications: Create enterprise-grade, scalable Python web applications easily with Django 2.0”, 2nd Edition 2018, and Packt Publishing.
2. Nigel George, “Build a website with Django”, 1st Edition 2019, GNW Independent Publishing Edition.
3. Ray Yao,” Django in 8 Hours: For Beginners, Learn Coding Fast! 2nd Edition 2020, independently published Edition.
4. Harry Percival, “Test-Driven Development with Python: Obey the Testing Goat: Using Django, Selenium, and JavaScript”, 2nd Edition 2019, Kindle Edition.

NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://youtu.be/eoPsX7MKfe8?list=PLIdgECt554OVFKXRpo_kuI0XpUQKk0ycO https://youtu.be/tA42nHmmEKw?list=PLh2mXjKcTPSACrQxPM2_1Ojus5HX88ht7 https://youtu.be/8ndsDXohLMQ?list=PLDsnL5pk7-N_9oy2RN4A65Z-PEnvtc7rf https://youtu.be/QXeEoD0pB3E?list=PLsyeobzWxl7poL9JTVyndKe62ieoN-MZ3 https://youtu.be/9MmC_uGjBsM?list=PL3pGy4HtqwD02GVgM96-V0sq4_DSinqvf
Unit 2	https://youtu.be/F5mRW0jo-U4 https://youtu.be/yD0_1DPmfKM?list=PLQVvvaa0QuDe9nqlirjacLkBYdgc2inh3 https://youtu.be/rHux0gMZ3Eg https://youtu.be/jBzwzrDvZ18 https://youtu.be/RiMRJMbLZmg
Unit 3	https://youtu.be/8DF1zJA7cfc https://youtu.be/CTrVDi3tt8o https://youtu.be/FzGTpnI5tpo https://youtu.be/z4lfVsb_7MA https://youtu.be/WuyKxdLcw3w
Unit 4	https://youtu.be/UxTwFMZ4r5k https://youtu.be/2Oe55iXjZQI https://youtu.be/zV8GOI5Zd6E https://youtu.be/uf2tdzh7Bq4 https://youtu.be/RzkVbz7Ie44
Unit 5	https://youtu.be/kBwhtEIXGII https://youtu.be/Q_YOYNiSVDY https://youtu.be/_3AKAdHUY1M https://youtu.be/6DI_7Zja8Zc https://youtu.be/UkokhawLKDU

B. TECH THIRD YEAR (ELECTIVE-II)

Course Code	ACSE0514	L T P	Credits
Course Title	DESIGN PATTERNS	3 0 0	3

Course objective: The course objective is to familiarize the student with techniques for designing reusable combinations of Java classes and organizing their cooperation to produce modular and maintainable Java programs.

Pre-requisites: Object Oriented Analysis and Design. Data structures and algorithms. Programming Language (C++ or Java)

Course Contents / Syllabus

UNIT-I	**Introduction**	**8 Hours**

Describing Design Patterns, Design Patterns in Smalltalk MVC, The Catalog of Design Patterns, Organizing the Catalogue, Design Patterns for Solving the Real Life Problems, Selection and Use of Design patterns. Principle of least knowledge.

UNIT-II	**Creational Design Pattern**	**8 Hours**

Creational Patterns: Abstract Factory, Builder, Factory Pattern, Prototype Pattern, Singleton pattern..

UNIT-III	**Structural Design Pattern**	**8 Hours**

Structural Pattern Part-I, Adapter, Bridge, Composite.
Structural Pattern Part-II, Decorator Pattern, Façade Pattern, Flyweight Pattern, Proxy Pattern.

UNIT-IV	**Behavioural Design Pattern – I**	**8 Hours**

Behavioural Patterns Part: I, Chain of Responsibility Pattern, Command Pattern, Interpreter Pattern, Iterator Pattern.
Behavioural Patterns Part: II, Mediator, Memento, Observer Pattern.

UNIT-V	**Behavioural Design Pattern – II**	**8 Hours**

Behavioural Patterns Part: III, State Patterns, Strategy, Template Patterns, Visitor, Expectation from Design Patterns

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

CO 1	Construct a design consisting of a collection of modules.	K2, K6
CO 2	Exploit well-known design patterns (such as Iterator, Observer, Factory and Visitor)	K4, K5
CO 3	Distinguish between different categories of design patterns	K4
CO 4	Ability to understand and apply common design patterns to incremental/iterative development	K2, K6
CO 5	Ability to identify appropriate patterns for design of given problem and Design the software using Pattern Oriented Architectures	K1, K2, K6

Text books:

1. Eric Freeman, Elisabeth Freeman, Kathy Sierra, Bert Bates Head First Design Patterns, 2004, O'Reilly
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides Design Patterns: Elements of Reusable Object-oriented Software Addison-Wesley, 1995

Reference Books:

1. Design Pattern s By Erich Gamma , Pearson Education
2. Patterns in JAVA Volume -I By Mark Grand, Wiley Dream

NPTEL/ YouTube/ Faculty Video Link:

https://youtu.be/C_oPLDaSy-8

https://youtu.be/NU_1StN5Tkk

B. TECH. THIRD YEAR 5th/ 6th			
Course code	**ANC0501**	**L T P**	**Credits**
Course Title	**CONSTITUTION OF INDIA, LAW AND ENGINEERING**	**2 0 0**	**2**

Course objective: To acquaint the students with legacies of constitutional development in India and help them to understand the most diversified legal document of India and philosophy behind it.

Pre-requisites: Computer Organization and Architecture

Course Contents / Syllabus

UNIT-I	**INTRODUCTION AND BASIC INFORMATION ABOUT INDIAN CONSTITUTION**	**8 Hours**

Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947,Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.

UNIT-II	**UNION EXECUTIVE AND STATE EXECUTIVE**	**8 Hours**

Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of Vice-President, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.

UNIT-III	**INTRODUCTION AND BASIC INFORMATION ABOUT LEGAL SYSTEM**	**8 Hours**

The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.

UNIT-IV	**INTELLECTUAL PROPERTY LAWS AND REGULATION TO INFORMATION**	**8 Hours**

Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information, Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.

UNIT-V	**BUSINESS ORGANIZATIONS AND E-GOVERNANCE**	**8 Hours**

Sole Traders, Partnerships: Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and

Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.

COURSE OUTCOMES: After completion of this course students will be able to

CO 1	Identify and explore the basic features and modalities about Indian constitution.	K1
CO 2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.	K2
CO 3	Differentiate different aspects of Indian Legal System and its related bodies.	K4
CO 4	Discover and apply different laws and regulations related to engineering practices.	K4
CO 5	Correlate role of engineers with different organizations and governance models	K4

Text Books:

1. M Laxmikanth: Indian Polity for civil services and other State Examination,6th Edition, Mc Graw Hill
2. Brij Kishore Sharma: Introduction to the Indian Constitution, 8th Edition, PHI Learning Pvt. Ltd.
3. Granville Austin: The Indian Constitution: Cornerstone of a Nation (Classic Reissue), Oxford University Press.

Reference Books:

1. Madhav Khosla: The Indian Constitution, Oxford University Press.
2. PM Bakshi: The Constitution of India, Latest Edition, Universal Law Publishing.
3. V.K. Ahuja: Law Relating to Intellectual Property Rights (2007)

B. TECH. THIRD YEAR 5th/ 6th			
Course code	**ANC0502**	**L T P**	**Credits**
Course Title	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**	**2 0 0**	**2**

Course objective: This course aims to provide basic knowledge about different theories of society, state and polity in India, Indian literature, culture, Indian religion, philosophy, science, management, cultural heritage and different arts in India.

Pre-requisites: Computer Organization and Architecture

Course Contents / Syllabus

UNIT-I	**SOCIETY STATE AND POLITY IN INDIA**	**8 Hours**

State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women.

UNIT-II	**INDIAN LITERATURE, CULTURE, TRADITION, AND PRACTICES**	**8 Hours**

Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Sikh Literature, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature ,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature

UNIT-III	**INDIAN RELIGION, PHILOSOPHY, AND PRACTICES**	**8 Hours**

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines , Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.

UNIT-IV	**SCIENCE, MANAGEMENT AND INDIAN KNOWLEDGE SYSTEM**	**8 Hours**

Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India , Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India ,Writing Technology in India Pyrotechnics in India Trade in Ancient India/,India's Dominance up to Pre-colonial Times.

UNIT-V	**CULTURAL HERITAGE AND PERFORMING ARTS**	**8 Hours**

Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Pottery, Painting, Indian Handicraft, UNESCO'S List of World Heritage sites in India, Seals, coins, Puppetry, Dance, Music, Theatre, drama, Martial Arts Traditions, Fairs and Festivals, UNESCO'S List of Intangible Cultural Heritage, Calenders, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema.

COURSE OUTCOMES: After completion of this course students will be able to

CO 1	Understand the basics of past Indian politics and state polity.	K2
CO 2	Understand the Vedas, Upanishads, languages & literature of Indian society.	K2
CO 3	Know the different religions and religious movements in India.	K4

CO 4	Identify and explore the basic knowledge about the ancient history of Indian agriculture, science & technology, and ayurveda.	K4
CO 5	Identify Indian dances, fairs & festivals, and cinema.	K1

Text Books:

1. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014.
2. S. Baliyan, Indian Art and Culture, Oxford University Press, India
3. Nitin Singhania, Indian Art and Culture: for civil services and other competitive Examinations,3rd Edition,Mc Graw Hill

Reference Books:

1. Romila Thapar, Readings In Early Indian History Oxford University Press, India
2. Basham, A.L., The Wonder that was India (34th impression), New Delhi, Rupa & co.

B. TECH. THIRD YEAR

Course code	ACSML0601	L T P	Credits
Course title	MACHINE LEARNING	3 0 0	3

Course objective: To introduction to the fundamental concepts in machine learning and popular machine learning algorithms. To understand the standard and most popular supervised learning algorithm.

Pre-requisites: Basic Knowledge of Machine learning.

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO MACHINE LEARNING	8 Hours

INTRODUCTION – Learning, Types of Learning, Well defined learning problems, Designing a Learning System, History of ML, Introduction of Machine Learning Approaches, Introduction to Model Building, Sensitivity Analysis, Underfitting and Overfitting, Bias and Variance, Concept Learning Task, Find – S Algorithms, Version Space and Candidate Elimination Algorithm, Inductive Bias, Issues in Machine Learning and Data Science Vs Machine Learning.

UNIT-II	MINING ASSOCIATION AND SUPERVISED LEARNING	8 Hours

Classification and Regression, Regression: Linear Regression, Multiple Linear Regression, Logistic Regression, Polynomial Regression, Decision Trees: ID3, C4.5, CART.
Apriori Algorithm: Market basket analysis, Association Rules.

Neural Networks: Introduction, Perceptron, Multilayer Perceptron, Support vector machine.

UNIT-III	UNSUPERVISED LEARNING	8 Hours

Introduction to clustering, K-means clustering, K-Nearest Neighbor, 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 & ENSEMBLE	8 Hours

Bayesian Learning, Bayes Optimal Classifier, Naıve Bayes Classifier, Bayesian Belief Networks.

Ensembles methods: Bagging & boosting, C5.0 boosting, Random Forest, Gradient Boosting Machines and XGBoost.

UNIT-V	REINFORCEMENT LEARNING & CASE STUDIES	8 Hours

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, QLearning Algorithm), Application of Reinforcement Learning.

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

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

CO1	Understanding utilization and implementation proper machine learning algorithm.	K2

CO2	Understand the basic supervised machine learning algorithms.	K2
CO3	Understand the difference between supervise and unsupervised learning.	K2
CO4	Understand algorithmic topics of machine learning and mathematically deep enough to introduce the required theory.	K2
CO5	Apply an appreciation for what is involved in learning from data.	K3

Text books:

1) Marco Gori , Machine Learning: A Constraint-Based Approach, Morgan Kaufmann. 2017
2) Ethem Alpaydin, Machine Learning: The New AI, MIT Press-2016
3) Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995
4) Tom M. Mitchell, "Machine Learning", McGraw-Hill, 2010

Reference Books:

1) Ryszard, S., Michalski, J. G. Carbonell and Tom M. Mitchell, Machine Learning: An Artificial Intelligence Approach, Volume 1, Elsevier. 2014
2) Stephen Marsland, Taylor & Francis 2009. Machine Learning: An Algorithmic Perspective.
3) Ethem Alpaydin, (2004) "Introduction to Machine Learning (Adaptive Computation and Machine Learning)", The MIT Press.

Fundamentals of Machine Learning for Predictive Data Anayltics: Algorithms, Worked Examples, and Case Studies 1st Edition by **John D. Kelleher**

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

Course Code	ACSE0602	L T P	Credits
Course Title	COMPUTER NETWORKS	3 1 0	4

Course objective:

Objective of this course is to develop an understanding of computer networking basics, different components of computer networks, various protocols, modern technologies and their applications.

Pre-requisites: Basic knowledge of Computer system and their interconnection, operating system, Digital logic and design and hands on experience of programming languages.

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

Goals and applications of networks, Categories of networks, Organization of the Internet, ISP, The OSI reference model, TCP/IP protocol suite, Network devices and components, Mode of communications

Physical Layer: Network topology design, Types of connections, LAN, MAN and MAN Transmission media, Signal transmission and encoding, Network performance and transmission impairments, Switching techniques and multiplexing, IEEE standards.

UNIT-II	Data Link layer	8 Hours

Framing, Error Detection and Correction, Flow control (Elementary Data Link Protocols, Sliding Window protocols). Medium Access Control and Local Area Networks: Channel allocation, Multiple access protocols, LAN standards, Link layer switches & bridges.

UNIT-III	Network Layer	8 Hours

Point-to-point networks, Logical addressing, Basic internetworking (IP, CIDR, ARP, RARP, DHCP, ICMP), IPv4, Routing, forwarding and delivery, Static and dynamic routing, Routing algorithms and protocols, Congestion control algorithms, IPv6.

UNIT-IV	Transport Layer	8 Hours

Process-to-process delivery, Transport layer protocols (UDP and TCP), Connection management, Flow control and retransmission, Window management, TCP Congestion control, Quality of service.

UNIT-V	Application Layer	8 Hours

Domain Name System, World Wide Web and Hyper Text Transfer Protocol, Electronic mail, File Transfer Protocol, Remote login, Network management, Data compression, VPN, Cryptography – basic concepts, Firewalls.

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

CO 1	Build an understanding of the fundamental concepts and Layered Architecture of computer networking.	K2, K6
CO 2	Understand the basic concepts of link layer properties to detect error and develop the solution for error control and flow control.	K2, K6
CO 3	Design, calculate, and apply subnet masks and addresses to fulfil networking requirements and calculate distance among routers in subnet.	K3, K4, K6
CO 4	Understand the duties of transport layer, Session layer with connection management of TCP protocol.	K2, K4
CO 5	Discuss the different protocols used at application layer.	K2

Text books:

1. Behrouz Forouzan, "Data Communication and Networking" Fourth Edition-2006, Tata McGraw Hill
2. Andrew Tanenbaum "Computer Networks", Fifth Edition-2011, Prentice Hall.
3. William Stallings, "Data and Computer Communication", Eighth Edition-2008, Pearson.

Reference Books:	
1. Kurose and Ross, “Computer Networking- A Top-Down Approach”, Eighth Edition-2021, Pearson.	
2. Peterson and Davie, “Computer Networks: A Systems Approach”, Fourth Edition-1996, Morgan Kaufmann	
NPTEL/ YouTube/ Faculty Video Link:	
Unit 1	https://www.youtube.com/watch?v=LX_b2M3IzN8
Unit 2	https://www.youtube.com/watch?v=LnbvhoxHn8M
Unit 3	https://www.youtube.com/watch?v=ddM9AcreVqY
Unit 4	https://www.youtube.com/watch?v=uwoD5YsGACg
Unit 5	https://www.youtube.com/watch?v=bTwYSA478eA&list=PLJ5C_6qdAvBH01tVf0V4PQsCxGE3hSqEr https://www.youtube.com/watch?v=tSodBEAJz9Y

B. TECH THIRD YEAR

Course code	ACSE0603	L T P	Credits
Course title	SOFTWARE ENGINEERING	3 0 0	3

Course objective:
"To teach the students all phases of the Software Development Life Cycle(SDLC) and their role in software development through theory as well as practice." Students will be able to apply the scientific knowledge in systematic way to create and build cost effective software solutions.

Pre-requisites: Basic knowledge about software and its types. Basic knowledge of OOPs concepts.

Course Contents / Syllabus

UNIT-I	INTRODUCTION	8 Hours

Introduction: Evolving role of software, Software Characteristics, Software crisis, Silver bullet, Software myths, Software Engineering Phases, Team Software Process (TSP), emergence of software engineering, Software process, project and product, Software Process Models: Waterfall Model, Prototype Model, Spiral Model, Iterative Model, Incremental Model, Agile Methodology: Scrum Sprint, Scrum Team, Scrum Master, Product Owner.

UNIT-II	SOFTWARE REQUIREMENT	8 Hours

Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Use Case Diagram, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Quality concepts, SQA activities, Formal approaches to SQA; Statistical software quality assurance; CMM, The ISO standard.

UNIT-III	SOFTWARE DESIGN	8 Hours

Software Design: Design principles, the design process; Design concepts: refinement, modularity: Cohesion, Coupling, Effective modular design: Functional independence, Design Heuristics for effective modularity, Software architecture: Function Oriented Design, Object Oriented Design: OOPs concepts-Abstraction, object, classification, inheritance, encapsulation, UML Diagrams-Class Diagram, Interaction diagram, Activity Diagram, control hierarchy: Top-Down and Bottom-Up Design, structural partitioning, software procedure.

UNIT-IV	SOFTWARE TESTING	8 Hours

Software Testing: Testing Objectives, 7 Principals of Testing, Levels of Testing: Unit Testing, System Testing, Integration Testing, User Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Functional Testing(DAO, BO) Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

UNIT-V	PROJECT MAINTENANCE AND MANAGEMENT CONCEPTS	8 Hours

Project management concepts, Planning the software project, Estimation: Software Measurement and Metrics, Various Size Oriented Measures-LOC based, FP based, Halestead's Software Science, Cyclomatic Complexity Measures: Control Flow Graphs, Use-case based, empirical estimation COCOMO- A Heuristic estimation techniques, staffing level estimation, team structures, risk analysis and management. Configuration Management, Software reengineering: reverse engineering, restructuring: forward engineering, Clean Room software engineering. Case Tools, Software Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Need of Maintenance.

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

CO 1	Identify, formulate, analyse, and solve problems, as well as identify the computing requirements appropriate to their solutions. The ability to work in one or more significant application domains	K2, K4, K5
CO 2	Design, implement, and evaluate software-based systems, components, or programs of varying complexity that meet desired needs, satisfy realistic constraints, and demonstrate accepted design and development principles.	K2, K3, K4, K6
CO 3	Apply knowledge of computing, mathematics, science, and engineering appropriate to the discipline, particularly in the modelling and design of software systems and in the analysis of trade-offs inherent in design decisions.	K3, K4
CO 4	Formulate testing strategies for software system, apply various testing techniques such as unit testing, test driven development and functional testing.	K3
CO 5	Understand ability to engage in life-long maintenance and continuing Software development using various software management tools.	K2, K5

Text books:

1. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers 3RDEdition(December 11, 2008)
2. RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill. 7thEdition.(14-Jan-2022)
3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.4th Edition.(1 January 2014)

Reference Books:

1. Pankaj Jalote, Software Engineering, Wiley. (1 January 2010)
2. Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication. 2nd Edition. (1 January 2007)
3. Kassem Saleh, "Software Engineering", Cengage Learning. (2009)
4. Ian Summerville, Software Engineering, Addison Wesley. 9th Edition.(29 October 2017)

NPTEL/ YouTube/ Faculty Video Link:

Unit 1	https://youtu.be/x-jqSXYE4S4
Unit 2	https://youtu.be/mGkkZoFc-4I
Unit 3	https://youtu.be/sGxgZxwuHzc
Unit 4	https://youtu.be/BNk7vni-1Bo
Unit 5	https://youtu.be/8swQr0kckZI

B. TECH THIRD YEAR

Course code	ACSML0651	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 Apriori algorithm using sample data in Python.	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 of ANN algorithm using a sample dataset.	CO2
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	Identify and apply Machine Learning algorithms to solve real-world problems.	K1
CO 3	Examine the requirements on special databases.	K4

B. TECH THIRD YEAR

Course Code	ACSE0652	L T P	Credit
Course Title	COMPUTER NETWORKS LAB	0 0 2	1

List of Experiments

Sr. No.	Name of Experiment	CO
1	To make an UTP cable with RJ-45 connector, and build and test simple network using UTP cable (crossover) and a hub based network.	CO1
2	Implementation of data link layer framing method such as bit stuffing in any language like C++, Java or Python.	CO2
3	Test the Network connection using ping command and use of ipconfig, netstat and trcert command provided by TCP/IP.	CO3
4	Implementation of CRC algorithm in any language like C++ , Java or Python.	CO3
5	Implementation of stop and wait protocol in any language like C++ , Java or Python.	CO3
6	Implementation of hamming code (7, 4) code to limit the noise. We have to code the bit data in to 7bit data by adding 3 parity bits. Implement in in any language like C++ , Java or Python.	CO3
7	Implementation of Caesar cipher technique & RSA algorithm in any language like C++ , Java or Python.	CO4
8	Write a program in java to find the IP address of the system.	CO4
9	Write a program in java to find the IP address of the any site if name is given.	CO4
10	Introduction to Network Devices (Repeater, Hub, Bridge, Switch, Router, Gateways, NIC etc.).	CO5
11	Introduction to CISCO Packet Tracer. Design Bus, Star, Mesh, Ring Topology and check the connectivity using ping command.	CO5
12	Switch Configuration on CISCO packet tracer using CLI.	CO5

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

CO 1	Build an understanding of UTP cable with RJ-45 connector, and build and test simple network using UTP cable.	K2, K4, K6
CO 2	Understand and implementation of the bit stuffing protocol.	K2, K3
CO 3	Understand and test the various network connection commands of TCP/IP and error control, flow control.	K2, K4
CO 4	Understand and implementation of the concept of IP addressing and security technique like Caesar cipher and RSA.	K2, K3
CO 5	Design and understanding the various topology and configuration of switch and router using cisco packet tracer	K2, K6

B. TECH THIRD YEAR

Course Code	ACSE0653	L T P	Credit
Course Title	SOFTWARE ENGINEERING LAB	0 0 2	1

List of Experiment:

Sr. No.	Name of Experiment	CO
1	Team formation and allotment of Mini project: Problem statement, Literature survey, Requirement analysis.	CO1
2	Draw the use case diagram: specify the role of each of the actors, Data Flow Diagram(DFD): All levels.	CO2
3	Design an ER diagram for with multiplicity.	CO2
4	Prepare a SRS document in line with the IEEE recommended standards.	CO2
5	Create a Software Design Document(SDD): Object and Class diagram.	CO3
6	Create Interaction diagram: sequence diagram, collaboration diagram for SDD.	CO3
7	Create Activity diagram and Component diagram for SDD	CO4
8	Estimation of Test Coverage Metrics and Structural Complexity.	CO5
9	Design test suite for equivalence class partitioning.	CO5
10	Design test cases for Boundary value analysis	CO5
11	Mini Project with CASE tools.	CO4

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

CO 1	Formulate and propose a plan for creating a model for real world problems.	K2,K4,K6
CO 2	Analyze structural Modeling.	K4
CO 3	Understand behavioral Modeling.	K2
CO 4	Create architectural Modeling.	K6
CO 5	Apply various testing strategies.	K3, K4

B. TECH. THIRD-YEAR (ELECTIVE-III)

Course code	ACSAI0615	L T P	Credits
Course title	DevOps on Cloud	3 0 0	3

Course objective: The objective of this course is to give a strong foundation of the Development and its Operations.

Pre-requisites: Adequate knowledge of Basics of Cloud Computing and its architecture covered through courses prior to this semester.

Course Contents / Syllabus

UNIT-I	DEVOPS INTRODUCTION	8 Hours

The Advent of Software Engineering - Waterfall method - Developers vs IT Operations conflict, Emergence and definition of DevOps, History of DevOps, Transformation with DevOps and Agile, Business Case for DevOps, Benefits of DevOps, Agile Practices, Focus on Products and Service, Autonomy of Teams, Introducing CALMS.

UNIT-II	RISE OF AGILE METHODOLOGIES	8 Hours

Agile movement in 2000 - Agile Vs Waterfall Method - Iterative Agile Software Development - Individual and team interactions over processes and tools - Working software over -comprehensive documentation - Customer collaboration over contract negotiation - Responding to change over following a plan.

UNIT-III	DEVOPS FOUNDATION	8 Hours

Foundational Terminology and Concepts, The Four Pillars of Effective DevOps, DevOps and Agile, Version Control Systems, DevOps using AWS. Security Management - IAM (Identity and Access Management), WAF (Web Application Firewall), AWS Shield, Guard Duty, Trusted Advisor, Governance Strategies.

UNIT-IV	PURPOSE OF DEVOPS	8 Hours

Minimum Viable Product - Application Deployment Continuous Integration, Continuous Deployment, and Build Tools, Tools: Ecosystem Overview (Software Development, Automation, Monitoring).

UNIT-V	CAMS (CULTURE, AUTOMATION, MEASUREMENT AND SHARING)	8 Hours

CAMS – Culture - CAMS – Automation - CAMS – Measurement - CAMS – Sharing Test-Driven Development - Configuration Management - Infrastructure Automation Root Cause Analysis – Blamelessness - Organizational Learning. Case Study: DevOps Using Cloud.

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

CO 1	Understand the traditional software development.	K2
CO 2	Learn the rise of agile methodologies.	K6
CO 3	Define and design the purpose of DevOps.	K3

CO 4	Understand the purpose of DevOps.	K4
CO 5	Analyze the culture and automation of DevOps	K5

Textbooks:

1) Effective Devops: Building A Culture of Collaboration, Affinity, And Tooling At Scale Paperback –2016 by Jennifer Davis.
2) The DevOps Handbook - Book by Gene Kim, Jez Humble, Patrick Debois, and Willis Willis.

Reference Books:

1) What is DevOps? - by Mike Loukides.

Links:

UNIT-I	https://aws.amazon.com/devops/what-is-devops/
UNIT-II	https://www.oreilly.com/library/view/agile-for-everybody/9781492033509/ch01.html
UNIT-III	https://docs.aws.amazon.com/IAM/latest/UserGuide/introduction.html https://docs.aws.amazon.com/waf/latest/developerguide/waf-chapter.html
UNIT-IV	https://www.scaledagileframework.com/devops/ https://www.youtube.com/watch?v=hQcFE0RD0cQ
UNIT-V	https://medium.com/@seanguthrie/devops-principles-the-cams-model-9687591ca37a https://www.urolime.com/blogs/cams-approach-to-devops/ https://www.youtube.com/watch?v=VySUutlo91E

B. TECH. THIRD YEAR (ELECTIVE-IV)

Course code	ACSAI0621	L T P	Credits
Course title	BIG DATA	3 0 0	3

Course objective: To understand the basic concepts of Big Data in cloud and analyse sample dataset using big data ecosystem.

Course Contents / Syllabus

UNIT-I	INTRODUCTION TO BIG DATA AND CLOUD	8 Hours

Introduction to Big Data: Types of digital data, history of Big Data innovation, introduction to Big Data platform, drivers for Big Data, Big Data architecture and characteristics, 5 Vs of Big Data, Big Data technology components, Big Data importance and applications, Big Data features, Big Data Analytics, modern data analytic tools.
Introduction to Cloud Computing: Definition of Cloud, Evolution of Cloud Computing, Underlying Principles of Parallel and Distributed Computing, Cloud Characteristics.

UNIT-II	HADOOP AND MAP-REDUCE	8 Hours

Hadoop: History of Hadoop, Apache Hadoop, the Hadoop Distributed File System, components of Hadoop, data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, Hadoop Echo System.
Map Reduce: Map-Reduce framework and basics, how Map Reduce works, anatomy of a Map-Reduce job run, failures, job scheduling, shuffle and sort, task execution, Map Reduce types, input formats, output formats, Map Reduce features, Real-world Map Reduce.

Hadoop Eco System and YARN: Hadoop ecosystem components, Hadoop 2.0 New Features, MRv2, YARN

UNIT-III	HADOOP ARCHITECTURE & FRAMEWORK	8 Hours

HDFS (Hadoop Distributed File System): Design of HDFS, HDFS concepts, benefits and challenges, file sizes, block sizes and block abstraction in HDFS, how does HDFS store, read, and write files, Flume and Scoop, Hadoop archives, Hadoop I/O: compression, serialization, Avro and file-based data structures. Hadoop Eco-System Frameworks: PIG , HIVE , HBASE , ZOOKEEPER.

Importing and Handling Relational Data in Hadoop using Sqoop , Scala , spark.

UNIT-IV	HADOOP IN CLOUD	8 Hours

Cloud Technologies And Advancements Hadoop: MapReduce, Cloud overview & characteristics, cloud service model (iaas, paas, saas) , cloud deployment model (public, private, hybrid), Google cloud platform (gcp) infrastructure overview create gcp account & console overview, Virtual Box , Google App Engine, Programming Environment for Google App Engine Open Stack Federation in the Cloud, our Levels of Federation, ederated Services and Applications, Future of Federation.

UNIT-V	NETWORK AND DATA STORAGE SERVICES	8 Hours

Virtual networks: virtual private cloud (vpc) & types, subnets , ip addresses (public/private), nic ,routes & route table , firewalls , network topology options .

Google cloud storage overview & Structure: cloud datastore, cloud bigtable : nosql big data service bigquery basics, how to use machine learning with Bigquery.

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

CO 1	Identify Big Data and relevance of Big Data Analytics.	K2
CO 2	Analyze Map Reduce and demonstrate its use in features extraction.	K4
CO 3	Explain the YARN and HDFC in Data management	K2
CO 4	Articulate the concept of Cloud Computing and evolution of cloud computing with characteristics .	K3
CO 5	Analyze the components of open stack & Google Cloud platform	K4

Text books:

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013. 2. Big-Data Black Book, DT Editorial Services, Wily India

2. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012. 5. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.

3. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012. 7. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.

Reference Books:

1. Alan Gates, "Programming Pig", O'Reilley, 2011.
2. Big-Data Black Book, DT Editorial Services, Wily India
3. Viktor Mayer-Schonberger, ennethCukier, Big Data: A Revolution that will transform how we live,work and think.

Links:

Unit 1	(4) noc19-cs33 Lecture 1-Introduction to Big Data - YouTube
Unit 2	(4) Lecture 26: Map-reduce and Hadoop - YouTube(3) Lecture 2 | Image Classification - YouTube
Unit 3	(4) Hadoop Ecosystem | Big Data Analytics Tools | Hadoop Tutorial | Edureka - YouTube (4) What is HDFS | Hadoop Distributed File System (HDFS) Introduction | Hadoop Training | Edureka - YouTube
Unit 4	(4) Hive Tutorial for Beginners | Hive Architecture | Hadoop Hive Tutorial | Hadoop Training | Edureka - YouTube (4) HBase Tutorial for Beginners | Introduction to Apache HBase | Hadoop Training | Edureka - YouTube https://www.youtube.com/watch?v=Qhc6RMaDkgY
Unit 5	(4) Sqoop Tutorial - How To Import Data From RDBMS To HDFS | Sqoop Hadoop Tutorial | Simplilearn - YouTube (4) Java in Spark | Spark-Submit Job with Spark UI Example | Tech Primers - YouTube (4) Java in Spark | Spark-Submit Job with Spark UI Example | Tech Primers - YouTube

B. TECH THIRD YEAR (ELECTIVE III)

Course code	ACSE0611	L T P	Credits
Course title	CRM DEVELOPMENT	3 0 0	3

Course objective: Meet the tools and technologies that power development on the Salesforce platform. Give your data structure with objects, fields, and relationships. Automate processes for every app, experience, and portal with declarative tools. Use Visual force to build custom user interfaces for mobile and web apps. Write robust code by executing Apex unit tests.

Pre-requisites: Creative thinking and which is being used by the creative talent in your business areas.

UNIT-I	Salesforce Fundamentals	8 Hours

Building blocks of Salesforce, Data model & Security model, Business process automation options, Master Sales Cloud and Service Cloud , Salesforce platform, Salesforce terminology, force platform,Multi-tenancy and cloud, Salesforce metadata and APIs, Salesforce architecture.

UNIT-II	Salesforce Data Modeling	8 Hours

Salesforce Data model, IDIC model QIC model, CRM value chain model ,Payne & Frow's five forces and CRM objects , Relationship types, Formula fields and roll-up summary fields ,Importing and exporting data

UNIT-III	Logic and Process Automation	8 Hours

Formulas and Validations, Formula Operators and Functions, Screen Flow Distribution, Salesforce Flow, Apex Basics , Apex Triggers, Database & .NET Basics, Search Solution Basics, Triggers and Order of Execution, Platform Events Basics, Process Automation Specialist, Apex Specialist, Apex integration Services, Apex Metadata API.

UNIT-IV	User Interface	8 Hours

General development, Apex code development Visualforce development , Sales dashboard , Visualforce performance ,Technique for optimizing performance Lightning Web Components Basics Lightning App Builders Development.

UNIT-V	Testing, Debugging, and Deployment	8 Hours

Apex Testing, Apex code Test Method, Custom controller and Controller Extension, Test Data Developer Console Basics, Asynchronous Apex, Debugging Tool and Techniques, Debug logs, Application lifecycle and development model, Change Set Development model.

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

CO1	Implement the working concept of variables	K1, K2
CO2	Apply the concepts of Data Management	K1, K2
CO3	Understand the concepts of APEX	K3
CO4	Understand the concepts of APEX Code development	K1, K2
CO5	Implement concepts of APEX Integration	K1, K3

Text Books:

1. Alok Kumar Rai : Customer Relationship Management : Concepts and Cases(Second Edition), PHI Learning, 2018
2. Bhasin- Customer Relationship Management (Wiley Dreamtech),2019
3. Salesforce for beginners by Shaarif Sahaalane book by Amazon(Online Edition)

Reference Books:
1. Salesforce : A quick Study laminated Reference Guide by Christopher Mathew Spencer eBook by Amazon(Online)
2. Salesforce Platform Developer By Vandevelde Jain Edition Ist 2018
3. Learning Salesforce Development By Paul Battisson E-book (Online)
NPTEL/ YouTube/Faculty Video Link:
www. Trailhead.salesforce.com
www.mindmajix.com/salesforce-tutorial
www,youtube.com/watch?v=7K42geizQCI

B. TECH THIRD YEAR (ELECTIVE-IV)

Course code	ACSE0613	L	T	P	Credits
Course Title	ROBOTICS PROCESS AUTOMATION (RPA)	3	0	0	3

Course objective: This course focus on The Robotic Process Automation (RPA) specialization offers comprehensive knowledge and professional-level skills focused on developing and deploying software robots. It starts with the basic concepts of Robotic Process Automation. It builds on these concepts and introduces key RPA Design and Development strategies and methodologies, specifically in the context of UiPath products. A student undergoing the course shall develop the competence to design and develop automation solutions for business processes.

Pre-requisites: Computer Organization and Architecture

Course Contents / Syllabus

UNIT-I	PROGRAMMING BASICS &RECAP	8 Hours

PROGRAMMING BASICS &RECAP: Programming Concepts Basics - Understanding the application - Basic Web Concepts - Protocols - Email Clients -. Data Structures - Data Tables - Algorithms - Software Processes - Software Design - Scripting - .Net Framework - .Net Fundamentals - XML - Control structures and functions - XML - HTML - CSS - Variables & Arguments.

UNIT-II	RPA Concepts	8 Hours

RPA Concepts: RPA Basics - History of Automation - What is RPA - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - What Processes can be Automated - Types of Bots - Workloads which can be automated - RPA Advanced Concepts - Standardization of processes - RPA Development methodologies - Difference from SDLC - Robotic control flow architecture - RPA business case - RPA Team - Process Design Document/Solution Design Document - Industries best suited for RPA - Risks & Challenges with RPA - RPA and emerging ecosystem

UNIT-III	RPA TOOL INTRODUCTION &BASICS	8 Hours

RPA TOOL INTRODUCTION &BASICS: Introduction to RPA Tool - The User Interface - Variables - Managing Variables - Naming Best Practices - The Variables Panel - Generic Value Variables - Text Variables - True or False Variables - Number Variables - Array Variables - Date and Time Variables - Data Table Variables - Managing Arguments - Naming Best Practices - The Arguments Panel - Using Arguments - About Imported Namespaces - Importing New Namespaces Control Flow - Control Flow Introduction - If Else Statements - Loops - Advanced Control Flow - Sequences - Flowcharts - About Control Flow - Control Flow Activities - The Assign Activity - The Delay Activity - The Do While Activity - The If Activity - The Switch Activity - The While Activity - The For Each Activity - The Break Activity - Data Manipulation - Data Manipulation Introduction - Scalar variables, collections and Tables - Text Manipulation - Data Manipulation - Gathering and Assembling Data

UNIT-IV	ADVANCED AUTOMATION CONCEPTS AND TECHNIQUES	8 Hours

ADVANCED AUTOMATION CONCEPTS AND TECHNIQUES : Recording and Advanced UI Interaction- Recording Introduction-Basic and Desktop Recording-Web Recording - Input/output Methods - Screen Scraping- Data Scraping - Scraping advanced techniques - Selectors - Selectors - Defining and Assessing Selectors - Customization - Debugging - Dynamic Selectors - Partial Selectors - RPA Challenge - Image, Text & Advanced Citrix Automation - Introduction to Image & Text Automation - Image based automation - Keyboard based automation - Information Retrieval - Advanced Citrix Automation challenges - Best Practices - Using tab for Images - Starting Apps - Excel Data Tables & PDF - Data Tables in RPA - Excel and Data Table basics - Data Manipulation in excel - Extracting Data from PDF - Extracting a single piece of data - Anchors - Using anchors in PDF

UNIT-V	**EMAIL AUTOMATION & EXCEPTIONAL**	**8 Hours**

EMAIL AUTOMATION & EXCEPTIONAL: Email Automation - Email Automation - Incoming Email automation - Sending Email, automation - Debugging and Exception Handling - Debugging Tools - Strategies for solving issues - Catching errors.

COURSE OUTCOMES: After completion of this course students will be able to

CO 1	Understand RPA principles, its features and applications	K3
CO 2	Demonstrate proficiency in handling several types of variables inside a workflow and data manipulation techniques	K3
CO 3	Gain insights into Desktop, Web, Citrix, Email Automation and exception handling.	K2
CO 4	Analyze and design a real-world automation project and debug the workflows.	K2
CO5	Student will be able to understand architecture of computing technology.	K2

TEXT BOOKS:

1. Tripathi, Alok Mani. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool–UiPath. Packt Publishing Ltd, 2018.
2. Primer, A. "Introduction to Robotic Process Automation." Institute for Robotic Process Automation (2015).
3. Murdoch, Richard. Robotic Process Automation: Guide to Building Software Robots, Automate Repetitive Tasks & Become an RPA Consultant. Richard Murdoch & RPA Ultra, 2018.
4. Taulli, Tom. "The robotic process automation handbook." The Robotic Process Automation Handbook. https://doi. org/10.1007/978-1-4842-5729-6 (2020).

Reference Books:

1. Gaonkar, Sushant. "Future of work: Leveraging the power of technologies to create a near-human like digital worker." Gavesana Journal of Management 13.1 (2020): 15-23.
2. Vellaichamy, Mr NMS S., Mr R. Dinesh, and Mrs JR Rajalakshmi. "Reskillng Indian Workforce: The Need of the Hour LavanyanjaliMukkerlaDr.Braou."

NPTEL/YouTube/Faculty Video Links:

Unit 1	https://www.youtube.com/watch?v=3SMZHd_ngIw
Unit 2	https://www.youtube.com/watch?v=3zXb8H3odek
Unit 3	https://www.youtube.com/watch?v=3zXb8H3odek
Unit 4	https://www.youtube.com/watch?v=3zXb8H3odek

B.TECH. THIRD YEAR (ELECTIVE-III)

Course code	ACSAI0617	L T P	Credits
Course title	PROGRAMMING FOR DATA ANALYTICS	3 0 0	3

Course objective: Demonstrate knowledge of statistical data analysis techniques utilized in business decision making. Apply principles of Data Science to the analysis of business problems. Use data mining software to solve real-world problems. Employ cutting edge tools and technologies to analyze Big Data.

Pre-requisites: Basic Knowledge of Python and R

Course Contents / Syllabus

UNIT-I	BASIC DATA ANALYSIS USING PYTHON/R	8 Hours

Pandas data structures – Series and Data Frame, Data wrangling using pandas, Statistics with Pandas, Mathematical Computing Using NumPy, Data visualization with Python Descriptive and Inferential Statistics, Introduction to Model Building, Probability and Hypothesis Testing, Sensitivity Analysis, Regular expression: RE packages.

UNIT-II	R GRAPHICAL USER INTERFACES	8 Hours

Built-in functions, Data Objects-Data Types & Data Structure, Structure of Data Items, Manipulating and Processing Data in R using Dplyr package & Stringr package, Building R Packages, Running and Manipulating Packages, data import and export, attribute and data types, descriptive statistics, exploratory data analysis, Flexdashboard and R-shiny.

UNIT-III	DATA ENGINEERING FOUNDATION	8 Hours

Connecting to a database (sqlite) using Python, Sending DML and DDL queries and processing the result from a Python Program, Handling error, NOSQL query using MongoDB, MongoDB Compass.

UNIT-IV	INTRODUCTION TO TENSOR FLOW AND AI	8 Hours

Introduction, Using TensorFlow for AI Systems, Up and Running with TensorFlow, Understanding TensorFlow Basics, Convolutional Neural Networks, Working with Text and Sequences, and TensorBoard Visualization, Word Vectors, Advanced RNN, and Embedding Visualization. TensorFlow Abstractions and Simplifications, Queues, Threads, and Reading Data, Distributed TensorFlow, Exporting and Serving Models with TensorFlow.

UNIT-V	DEEP LEARNING WITH KERAS	8 Hours

Introducing Advanced Deep Learning with Keras, Deep Neural Networks, Autoencoders, Generative Adversarial Networks (GANs), Improved GANs, Disentangled Representation GANs, Cross-Domain GANs, Variational Autoencoders (VAEs), Deep Reinforcement Learning, Policy Gradient Methods.

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

CO1	Install, Code and Use Python & R Programming Language in R Studio IDE to perform basic tasks on Vectors, Matrices and Data frames.	K1
CO2	Implement the concept of the R packages.	K3
CO3	Understand the basic concept of the MongoDB.	K2
CO4	Understand and apply the concept of the RNN and tensorflow.	K4
CO5	Understand and evaluate the concept of the keras in deep learning.	K4

Textbooks:

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

2. Learning TensorFlow by Tom Hope, Yehezkel S. Resheff, Itay Lieder O'Reilly Media, Inc.

3. Advanced Deep Learning with TensorFlow 2 and Keras: Apply DL, GANs, VAEs, deep RL, unsupervised learning, object detection and segmentation, and more, 2nd Edition.

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

Reference Books:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, 1 st Edition, Wrox, 2013.

2. Chris Eaton, Dirk Deroos et. al., “Understanding Big data”, Indian Edition, McGraw Hill, 2015.

3. Tom White, “HADOOP: The definitive Guide”, 3 rd Edition, O Reilly, 2012

Links:

Unit 1	https://www.ibm.com/cloud/blog/python-vs-r
Unit 2	https://www.youtube.com/watch?v=C5R5SdYzQBI
Unit 3	https://hevodata.com/learn/data-engineering-and-data-engineers/
Unit 4	https://www.youtube.com/watch?v=IjEZmH7byZQ
Unit 5	https://www.youtube.com/watch?v=pWp3PhYI-OU

B. TECH THIRD YEAR (ELECTIVE-IV)

Course code	ACSAI0622	L T P	Credits
Course title	SOCIAL MEDIA ANALYTICS	3 0 0	3

Course objective: To understand text mining and social media data analytic activities and apply the complexities of processing text and network data from different data sources.

Pre-requisites: Python/R.

Course Contents / Syllabus

UNIT-I	SENTIMENT MINING	8 Hours

Text Representation- tokenization, stemming, stop words, TF-IDF, Feature Vector Representation, NER, N-gram modelling, Text Clustering, Text Classification, Topic Modelling-LDA, HDP. Sentiment Classification, feature based opinion mining, comparative sentence, and relational mining, Opinion spam.

UNIT-II	WEB-MINING	8 Hours

Web Search, Data Mining, and Machine Learning for extracting knowledge from the web, Inverted indices and Boolean queries. PLSI, Query optimization, page ranking, Essentials of Social graphs, Social Networks, Models, Information Diffusion in social media.

UNIT-III	MINING SOCIAL MEDIA	8 Hours

Essentials of Social graphs, Social Networks, Models, Information Diffusion in social media, Behavioural Analytics, Influence and Homophily, Recommendation in social media.

UNIT-IV	TEXT SUMMARIZATION	8 Hours

Introduction to Text Summarization, Text Processing, N-gram Frequency Count and Phrase Mining, LDA Topic Modelling, Machine-Learned Classification and Semantic Topic Tagging.

UNIT-V	RECENT TRENDS	8 Hours

Trend Analysis, Types of trend analysis, Recent Trends in Text, Web, and Social Media Analytics, Free social media analytics tools, Facebook Insights, Twitter analytics, Google analytics.

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

CO 1	Design new solutions to opinion extraction, sentiment classification and data summarization problems.	K6
CO 2	Apply a wide range of classification, clustering, estimation and prediction algorithms on web data.	K3
CO 3	Perform social network analysis to identify important social actors, subgroups and network properties in social media sites.	K3
CO 4	Interpret the terminologies, metaphors and perspectives of text summarization.	K2
CO 5	Apply state of the art mining tools and libraries on realistic data sets as a basis for business decisions and applications.	K4

Textbooks

1. BingLiu,“WebDataMining-ExploringHyperlinks,Contents,andUsageData”,Springer,Second Edition, 2011.

2. Reza Zafarani, Mohammad Ali Abbasiand HuanLiu,“Social Media Mining-An Introduction”, Cambridge University Press, 2014.

3. Bing Liu, “Sentiment Analysis and Opinion Mining”, Morgan & Claypool Publishers, 2012.

Reference Books

1. Nitin Indurkhya, FredJDamerau,“HandbookofNaturalLanguageProcess”,2ndEdition,CRC Press, 2010.

2. Matthew A. Russell, “Mining the social web”, 2nd edition- O'Reilly Media, 2013.

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	https://www.youtube.com/watch?v=Uqs0GewlMkQ https://www.youtube.com/watch?v=tUNwSH7671Y&t=2s https://www.youtube.com/watch?v=zz1CFBS4NaY
Unit 2	https://slideplayer.com/slide/14222744/
Unit 3	https://www.youtube.com/watch?v=KjWu1-dZn00
Unit 4	https://www.youtube.com/watch?v=ntOaoW0T604
Unit 5	https://www.youtube.com/watch?v=otoXeVPhT7Q&list=PL34t5iLfZddt0tt5GdDy3ny6X5RQvwrp6&index=2

B. TECH THIRD YEAR (ELECTIVE III)

Course Code	ACSAI0612	L T P	Credits
Course Title	ADVANCED JAVA PROGRAMMING	3 0 0	3

Course objective:

Objective of this course is to provide the ability to design console based, GUI based ,web based applications, integrated development environment to create, debug and run multi-tier and enterprise-level applications.

Pre-requisites: Basics of C, C++, and basic concept of Core JAVA.

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

JDBC: Introduction, JDBC Driver, DB Connectivity, Driver Manager, Connection, Statement, Result Set, Prepared Statement, Transaction Management, Stored Procedures.

Servlet: Servlet Overview, Servlet API, Servlet Interface, Generic Servlet, HTTP Servlet, Servlet Life Cycle, Redirect requests to other resources, Session Tracking, Event and Listener.

UNIT-II	JSP	8 Hours

JSP: Introduction, Overview, JSP Scriptlet Tag, JSP expression Tag, JSP declaration Tag, Life Cycle of JSP, JSP API, Implicit Objects: JSP request, JSP response, JSP config, JSP session, JSP Application, JSP Page Context; JSP Page, JSP Exception.

UNIT-III	Spring 5.0	8 Hours

Spring 5.0: Spring Core Introduction and Overview, Managing Beans, The Spring Container, The Factory Pattern, Dependency Injection (DI), Spring Managed Bean Lifecycle, Constructor Injection, Metadata/Configuration: Life Cycle Annotations, Java Configuration, XML Free configuration.

UNIT-IV	Spring MVC & Spring Boot	8 Hours

Spring MVC: Introduction/Developing Web Application with Spring MVC, Advanced Techniques, Spring Controllers

Spring Boot: Spring Boot Starters, CLI, Application Class, Logging, Auto Configuration Classes, Spring Boot dependencies, Spring data JPA introduction and Overview.

UNIT-V	JPA	8 Hours

JPA: Introduction & overview of data persistence, Overview of ORM tools, Understanding JPA, Entities: Requirement for Entity Class, Persistent Fields and Properties, Primary keys in Entries, Entity Management, Querying Entities, Entities Relationships.

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

CO 1	Understand the concept of implementing the connection between Java and Database using JDBC.	K2, K4
CO 2	Understand, Analyse, and Build dynamic web pages for server-side programming	K2, K3
CO 3	Analyze and design the Spring Core Modules and DI to configure and wire beans (application objects) together	K4,K5
CO 4	Design Model View Controller architecture and ready components that can be used to develop flexible and loosely coupled web applications.	K2, K3, K6
CO 5	Deploy JPA to Map, store, retrieve, and update data from java objects to relational databases and vice versa.	K5

Text books:

1. Bhave, "Programming with Java", Pearson Education, 2009
2. Herbert Schieldt, "The Complete Refernce: Java", TMH, 1991
3. Hans Bergsten, "Java Server Pages", SPD O'Really, 1985
4. Katy Sierra and Bert Bates, "Head First: Java", O'Really, 2008
5. Katy Sierra and Bert Bates, "Head First: Servlets & JSP", O'Really , 2008

Reference Books:

1. NaughtonSchildt, "The Complete Refernce: JAVA2", TMH ,1991
2. Balagurusamy E, "Programming in JAVA", TMH, 2010
3. Introduction to Web Development with HTML, CSS, JavaScript (Cousera Course)

NPTEL/ YouTube/ Faculty Video Link:

Unit1	https://youtu.be/96xF9phMsWA https://youtu.be/Zopo5C79m2k https://youtu.be/ZliIs7jHi1s https://youtu.be/htbY9-yggB0
Unit2	https://youtu.be/vHmUVQKXlVo https://youtu.be/qz0aGYrrlhU https://youtu.be/BsDoLVMnmZs https://youtu.be/a8W952NBZUE
Unit 3	https://youtu.be/1Rs2ND1ryYc https://youtu.be/vpAJ0s5S2t0 https://youtu.be/GBOK1-nvdU4 https://youtu.be/Eu7G0jV0ImY
Unit 4	https://youtu.be/-qfEOE4vtxE

	https://youtu.be/PkZNo7MFNFg https://youtu.be/W6NZfCO5SIk https://youtu.be/DqaTKBU9TZk
Unit 5	https://youtu.be/_GMEqhUyyFM https://youtu.be/ImtZ5yENzgE https://youtu.be/xIApzP4mWyA https://youtu.be/qKR5V9rdht0

B. TECH THIRD YEAR (ELECTIVE IV)

Course Code	ACSE0614	L T P	Credits
Course Title	WEB DEVELOPMENT USING MEAN STACK	3 0 0	3

Course objective:

This course focuses on how to design and build static as well as dynamic webpages and interactive web applications. Students examine advanced topics like Angular, nodejs, Mongodb and Express framework for interactive web applications that use rich user interfaces.

Pre-requisites: Basic knowledge of HTML, CSS and ES6 required.

Course Contents / Syllabus

UNIT-I	Introduction to Nodejs	8 Hours

Installing Nodejs, Node in-built packages (buffer, fs, http, os, path, util, url) Node.js modules, File System Module, Json data, Http Server and Client, Error handling with appropriate HTTP, Callback function, asynchronous programing REST API's(GET, POST PUT, DELETE UPDATE), GraphQL, Promises, Promise Chaining, Introduction to template engine (EJS).

UNIT-II	Express Framework	8 Hours

Configuring Express, Postman configuration, Environment Variables, Routing, Defining pug templates, HTTP method of Express, URL binding, middleware function, Serving static files, Express sessions, REST full API's, FORM data in Express, document modeling with Mongoose.

UNIT-III	Basics of Angular js	8 Hours

Typescript, Setup and installation, Power of Types, Functions, Function as types Optional and default parameters, Arrow functions, Function overloading, Access modifiers, Getters and setters, Read-only & static, Abstract classes, Interfaces, Extending and Implementing Interface, Import and Export modules.

UNIT-IV	Building Single Page App with Angular js	8 Hours

MVC Architecture, One-way and Two-way data binding, AngularJS Expressions, AngularJS Controllers, AngularJS Modules, adding controller to a module, Component, Dependency Injection, Filters, Tables, AngularJS Forms and Forms validation, Select using ng-option, AngularJS AJAX.

UNIT-V	Connecting Angular js with MongoDB	8 Hours

Environment Setup of Mongodb, data modeling, The current SQL/NoSQL landscape, Create collection in Mongodb, CRUD Operations in MongoDB. Mongo's feature set, Introduction to Mongoose, understanding mongoose schemas and datatypes, Connecting Angular with mongoDB using API.

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

CO 1	Explain, analyze and apply the role of server-side scripting language like Nodejs in the workings of the web and web applications.	K2, K3
CO 2	Demonstrate web application framework i.e., Express is to design and implement typical dynamic web pages and interactive web based applications.	K3, K6
CO 3	Apply the knowledge of Typescript that are vital in understanding angular is, and analyze the concepts, principles and methods in current client-side technology to implement angular application over the web.	K3, K6
CO 4	Analyze build and develop single page application using client-side programming i.e. angular js and also develop a static web application.	K3, K4

CO 5	Understand the impact of web designing by database connectivity with Mongodb in the current market place where everyone use to prefer electronic medium for shoping, commerce, and even social life also.	K2, K3

Text books:

1. Amos Q. Haviv (Author), Adrian Mejia (Author), Robert Onodi (Author), "Web Application Development with MEAN",3rdIllustrated Edition 2017,Packt Publications.
2. Simon Holmes (Author), Clive Herber (Author), "Getting MEAN with Mongo, Express, Angular, and Node", 2nd Edition 2016, Addison Wesley Publication.
3. Dhruti Shah, "Comprehensive guide to learn Node.js", 1st Edition, 2018 BPB Publications.
4. Christoffer Noring, Pablo Deeleman, "Learning Angular",3rd Edition,2017
5. Packt publications.

Reference Books:

1. Anthony Accomazzo, Ari Lerner, and Nate Murray, "Fullstack Angular: The Complete Guide to AngularJS and Friends",4th edition, 2020 International Publishing.
2. David Cho, "Full-Stack Angular, Type Script, and Node: Build cloud-ready web applications using Angular 10 with Hooks and GraphQL",2nd edition, 2017 Packt Publishing Limited.
3. Richard Haltman & Shubham Vernekar, "Complete node.js: The fast guide: Learn complete backend development with node.js"5th edition, 2017 SMV publication.
4. Glenn Geenen,Sandro Pasquali , Kevin Faaborg, "Mastering Node.js: Build robust and scalable real-time server-side web applications efficiently" 2nd edition Packt Publishing Limited.
5. Greg Lim,"Beginning Node.js, Express & MongoDB Development ,kindle edition, international publishing.
6. Daniel Perkins, "AngularJS Master Angular.js with simple steps, guide and instructions" 3rd edition, 2015 SMV publication.
7. Peter Membrey, David Hows, Eelco Plugge, "MongoDB Basics", 2nd edition,2018 International Publication.

NPTEL/ YouTube/ Faculty Video Link:

Unit-1	https://youtu.be/BLl32FvcdVM https://youtu.be/fCACk9ziarQ https://youtu.be/YSyFSnisip0 https://youtu.be/mGVFltBxLKU https://youtu.be/bWaucYA1YRI
Unit-2	https://youtu.be/7H_QH9nipNs https://youtu.be/AX1AP83CuK4 https://youtu.be/SccSCuHhOw0 https://youtu.be/lY6icfhap2o https://youtu.be/z7ikpQCWbtQ
Unit-3	https://youtu.be/0LhBvp8qpro https://youtu.be/k5E2AVpwsko https://youtu.be/SQJkj0WYWOE?list=PLvQjNLQMdagP3OzoBMfBT48uJ-SPfSsWj https://youtu.be/0eWrpsCLMJQ?list=PLC3y8-rFHvwhBRAgFinJR8KHIrCdTkZcZ https://youtu.be/ZSB4JcLLrIo
Unit-4	https://youtu.be/0LhBvp8qpro https://youtu.be/k5E2AVpwsko https://youtu.be/SQJkj0WYWOE?list=PLvQjNLQMdagP3OzoBMfBT48uJ-SPfSsWj https://youtu.be/0eWrpsCLMJQ?list=PLC3y8-rFHvwhBRAgFinJR8KHIrCdTkZcZ https://youtu.be/ZSB4JcLLrIo
Unit-5	https://youtu.be/Kvb0cHWFkdc

	https://youtu.be/pQcV5CMara8 https://youtu.be/c3Hz1qUUIyQ https://youtu.be/Mfp94RjugWQ https://youtu.be/SyEQLbbSTWg

B. TECH. THIRD YEAR 5th/ 6th			
Course code	**ANC0602**	**L T P**	**Credits**
Course Title	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**	**2 0 0**	**2**

Course objective: This course aims to provide basic knowledge about different theories of society, state and polity in India, Indian literature, culture, Indian religion, philosophy, science, management, cultural heritage and different arts in India

Pre-requisites: Computer Organization and Architecture

Course Contents / Syllabus

UNIT-I	**SOCIETY STATE AND POLITY IN INDIA**	**8 Hours**

State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women.

UNIT-II	**INDIAN LITERATURE, CULTURE, TRADITION, AND PRACTICES**	**8 Hours**

Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Sikh Literature, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature ,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature

UNIT-III	**INDIAN RELIGION, PHILOSOPHY, AND PRACTICES**	**8 Hours**

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines, Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.

UNIT-IV	**SCIENCE, MANAGEMENT AND INDIAN KNOWLEDGE SYSTEM**	**8 Hours**

Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India, Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India ,Writing Technology in India Pyrotechnics in India Trade in Ancient India/,India's Dominance up to Pre-colonial Times.

UNIT-V	**CULTURAL HERITAGE AND PERFORMING ARTS**	**8 Hours**

Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Pottery, Painting, Indian Handicraft, UNESCO'S List of World Heritage sites in India, Seals, coins, Puppetry, Dance, Music, Theatre, drama, Martial Arts Traditions, Fairs and Festivals, UNESCO'S List of Intangible Cultural Heritage, Calenders, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema.

COURSE OUTCOMES: After completion of this course students will be able to

CO 1	Understand the basics of past Indian politics and state polity.	K2
CO 2	Understand the Vedas, Upanishads, languages & literature of Indian society.	K2

CO 3	Know the different religions and religious movements in India.	K4
CO 4	Identify and explore the basic knowledge about the ancient history of Indian agriculture, science & technology, and ayurveda.	K4
CO 5	Identify Indian dances, fairs & festivals, and cinema.	K1

Text Books:

1. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014.
2. S. Baliyan, Indian Art and Culture, Oxford University Press, India
3. Nitin Singhania, Indian Art and Culture: for civil services and other competitive Examinations,3rd Edition,Mc Graw Hill

Reference Books:

1. Romila Thapar, Readings In Early Indian History Oxford University Press, India
2. Basham, A.L., The Wonder that was India (34th impression), New Delhi, Rupa & co.

B. TECH. THIRD YEAR 5th/ 6th			
Course code	**ANC0601**	**L T P**	**Credits**
Course Title	**CONSTITUTION OF INDIA, LAW AND ENGINEERING**	**2 0 0**	**2**

Course objective: To acquaint the students with legacies of constitutional development in India and help them to understand the most diversified legal document of India and philosophy behind it.

Pre-requisites: Computer Organization and Architecture

Course Contents / Syllabus

UNIT-I	**INTRODUCTION AND BASIC INFORMATION ABOUT INDIAN CONSTITUTION**	**8 Hours**

Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947,Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.

UNIT-II	**UNION EXECUTIVE AND STATE EXECUTIVE**	**8 Hours**

Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of Vice-President, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.

UNIT-III	**INTRODUCTION AND BASIC INFORMATION ABOUT LEGAL SYSTEM**	**8 Hours**

The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.

UNIT-IV	**INTELLECTUAL PROPERTY LAWS AND REGULATION TO INFORMATION**	**8 Hours**

Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information, Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.

UNIT-V	**BUSINESS ORGANIZATIONS AND E-GOVERNANCE**	**8 Hours**

Sole Traders, Partnerships: Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.

COURSE OUTCOMES: After completion of this course students will be able to

CO 1	Identify and explore the basic features and modalities about Indian constitution.	K1
CO 2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.	K2
CO 3	Differentiate different aspects of Indian Legal System and its related bodies.	K4
CO 4	Discover and apply different laws and regulations related to engineering practices.	K4
CO 5	Correlate role of engineers with different organizations and governance models	K4

Text Books:

1. M Laxmikanth: Indian Polity for civil services and other State Examination,6th Edition, Mc Graw Hill
2. Brij Kishore Sharma: Introduction to the Indian Constitution, 8th Edition, PHI Learning Pvt. Ltd.
3. Granville Austin: The Indian Constitution: Cornerstone of a Nation (Classic Reissue), Oxford University Press.

Reference Books:

1. Madhav Khosla: The Indian Constitution, Oxford University Press.
2. PM Bakshi: The Constitution of India, Latest Edition, Universal Law Publishing.
3. V.K. Ahuja: Law Relating to Intellectual Property Rights (2007)