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

Affiliated to

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

Evaluation Scheme & Syllabus

For

Bachelor of Technology

Computer Science & Engineering

Third Year

(Effective from the Session: 2025-26)

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

Bachelor of Technology
Computer Science & Engineering

Evaluation Scheme
SEMESTER-V

Sl. No.	Subject Codes	Subject	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BCSML0501	Machine Learning	Mandatory	3	1	0	30	20	50		100		150	4
2		Departmental Elective -I	Departmental Elective	3	0	0	30	20	50		100		150	3
3		Departmental Elective -II	Departmental Elective	3	0	0	30	20	50		100		150	3
4	BCSCC0501	Design Thinking-II	Mandatory	2	1	0	30	20	50		100		150	3
5	BCSML0551	Machine Learning Lab	Mandatory	0	0	4				50		50	100	2
6	BCSE0555	Web Technologies	Mandatory	0	0	6				50		100	150	3
7	BCSE0551	Software Engineering & Design	Mandatory	0	0	6				50		100	150	3
8	BCSE0559	Internship Assessment-II	Mandatory	0	0	2				50			50	1
9	BNC0501/ BNC0502	Constitution of India, Law and Engineering / Essence of Indian Traditional Knowledge	Compulsory Audit	2	0	0	30	20	50		50		100	NA
10		*Massive Open Online Courses (For B.Tech. Hons. Degree)	MOOCs											
		GRAND TOTAL		**13**	**2**	**18**			**200**	**200**	**400**	**250**	**1050**	**22**

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

Sr. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0078	Explore Machine Learning using Python	Infosys Wingspan (Infosys Springboard)	17h 7m	1
2	BMC0096	Scrum In Practice	Infosys Wingspan (Infosys Springboard)	26h 30m	2
3	BMC0060	Twitter Bootstrap	Infosys Wingspan (Infosys Springboard)	23h	1.5

PLEASE NOTE: -

- **A 3-4 weeks Internship shall be conducted during summer break after semester-IV and will be assessed during semester-V**
- **Compulsory Audit (CA) Courses (Non-Credit - BNC0501/BNC0502)**
  - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
  - The 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., CE: Core Elective,OE:Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

List of Departmental Electives

Sl.No.	Subject Codes	Subject Name	Types of Subjects	Bucket Name	Branch	Semester
1	BCSAI0513	Introduction to Artificial Intelligence	Departmental Elective-I	AI/ML	CSE	5
2	BCSAI0522	Image processing and pattern Recognition	Departmental Elective-II		CSE	5
3	BCS0511	Introduction to cloud computing	Departmental Elective-I	Cloud Computing	CSE	5
4	BCSAI0520	Cloud Virtualization	Departmental Elective-II		CSE	5
5	BCSE0511	CRM Fundamentals	Departmental Elective-I	CRM-RPA	CSE	5
6	BCSE0513	CRM Administration	Departmental Elective-II		CSE	5
7	BCSE0512	Python web development with Django	Departmental Elective-I	Full Stack Development	CSE	5
8	BCSE0514	Design Patterns	Departmental Elective-II		CSE	5

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Evaluation Scheme
SEMESTER-VI

Sl. No.	Subject Codes	Subject	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BCSE0602	Computer Networks	Mandatory	3	1	0	30	20	50		100		150	4
2		Departmental Elective –III	Departmental Elective	3	0	0	30	20	50		100		150	3
3		Departmental Elective –IV	Departmental Elective	3	0	0	30	20	50		100		150	3
4		Open Elective-I	Open Elective	3	0	0	30	20	50		100		150	3
5	BCSE0651	Advanced Java Programming	Mandatory	0	0	6				50		100	150	3
6	BCSE0652	Computer Networks Lab	Mandatory	0	0	2				25		25	50	1
7	BCSDS0651	Data Analytics	Mandatory	0	0	6				50		100	150	3
8	BCSE0659	Mini Project	Mandatory	0	0	6				50		100	150	3
9	BNC0602/ BNC0601	Essence of Indian Traditional Knowledge / Constitution of India, Law and Engineering	Compulsory Audit	2	0	0	30	20	50		50			NA
10		*Massive Open Online Courses (For B.Tech. Hons. Degree)	MOOCs											
		GRAND TOTAL		**14**	**1**	**20**			**200**	**175**	**400**	**325**	**1100**	**23**

*** List of MOOCs 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	BMC0074	Data Analysis with Pandas and Python	Infosys Wingspan (Infosys Springboard)	19h 49m	1.5
2	BMC0086	Java Programming Fundamentals	Infosys Wingspan (Infosys Springboard)	36h 10m	3
3	BMC0027	Network Fundamentals	Infosys Wingspan (Infosys Springboard)	37h 57m	3
4	BMC0100	TechA Java Developer Certification	Infosys Wingspan (Infosys Springboard)	25h 28m	2

PLEASE NOTE: -

- **A 3-4 weeks Internship shall be conducted during summer break after semester-VI and will be assessed during Semester-VIII**
- **Compulsory Audit (CA) Courses (Non-Credit - BNC0601/BNC0602)**
  - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
  - The 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., CE: Core Elective,OE:Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

List of Departmental Electives

S.No.	Subject Codes	Subject Name	Types of Subject	Bucket Name	Branch	Semester
1	BCSML0611	Deep Learning	Departmental Elective-III	AI/ML	CSE	6
2	BCSAI0619	Business Intelligence and Data Visualization	Departmental Elective-IV		CSE	6
3	BCSAI0611	Cloud Storage Management	Departmental Elective-III	Cloud Computing	CSE	6
4	BCSAI0621	Big Data	Departmental Elective-IV		CSE	6
5	BCSE0611	CRM Development	Departmental Elective-III	CRM-RPA	CSE	6
6	BCSE0613	Robotics Process Automation(RPA)	Departmental Elective-IV		CSE	6
7	BCSE0614	Web Development using MEAN stack	Departmental Elective-III	Full Stack Development	CSE	6
8	BCSE0612	Full-Stack Web Development using Laravel with Vue.JS	Departmental Elective-IV		CSE	6

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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		
Subject Code: BCSML0501		**L T P** 3-1-0
Subject Name: MACHINE LEARNING		**Credits** 4
Pre- requisites: Basic knowledge of python programming		
Course Contents/Syllabus		
Unit-1	INTRODUCTION TO MACHINE LEARNING: 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.	8 hours
Unit-2	MINING ASSOCIATION AND SUPERVISED LEARNING: 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.	8 hours
Unit-3	UNSUPERVISED LEARNING: 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.	8 hours
Unit-4	PROBABILISTIC LEARNING & ENSEMBLE: Bayesian Learning, Bayes Optimal Classifier, Naıve Bayes Classifier, Bayesian Belief Networks, Bagging & boosting, C5.0 boosting, Random Forest, Gradient Boosting Machines and XGBoost.	8 hours
Unit-5	sREINFORCEMENT LEARNING & CASE STUDIES: 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.	8 hours

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

CO1	Understand the utilization and implementation of proper machine learning algorithm.	K2
CO2	Analyse and apply the supervised machine learning algorithms.	K4
CO3	Analyse and apply the unsupervised machine learning algorithms.	K4
CO4	Analyse and apply Probabilistic approach of learning & ensemble methods.	K4
CO5	Analyse Reinforcement learning & its applications.	K4

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

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=fC7V8QsPBec&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=3

https://www.youtube.com/watch?v=OTAR0kT1swg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=4
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=wTF6vzS9fy4
https://www.youtube.com/watch?v=lt65K-REdHw

https://www.youtube.com/watch?v=HTSCbxSxsg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=5
https://www.youtube.com/watch?v=NnlS2BzXvyM
https://www.youtube.com/watch?v=7enWesSofhg

https://youtu.be/rthuFS5LSOo
https://www.youtube.com/watch?v=kho6oANGu_A

https://www.youtube.com/watch?v=9vMpHk44XXo&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=6
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		
Subject Code: BCSCC0501		**L T P** 2-1-0
Subject Name: DESIGN THINKING –II		**Credits** 3
Pre- requisites: Student must complete Design Thinking-I course.		
Course Contents/Syllabus		
Unit-1	Introduction: 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 its 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.	8 hours
Unit-2	Refinement and Prototyping: 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.	8 hours
Unit-3	Storytelling, Testing and Assesment: 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	8 hours

	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-4	Innovation, quality and Leadership : 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.	8 hours
Unit-5	sUnderstanding Human Desirability : 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.	8 hours

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

CO1	Learn sophisticated design tools to sharpen their problem-solving skills	K2
CO2	Construct innovate ideas using design thinking tools and converge to feasible idea for breakthrough solution	K6
CO3	Implement storytelling for persuasive articulation	K3
CO4	Understanding the nature of leadership empowerment	K2
CO5	Understand the role of a human being in ensuring harmony in society and nature	K2

Text Books:

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/You Tube/Web Link

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

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

https://www.youtube.com/watch?v=HTSCbxSxsg&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=5
https://www.youtube.com/watch?v=NnlS2BzXvyM
https://www.youtube.com/watch?v=7enWesSofhg

https://youtu.be/rthuFS5LSOo
https://www.youtube.com/watch?v=kho6oANGu_A

https://www.youtube.com/watch?v=9vMpHk44XXo&list=PL1xHD4vteKYVpaIiy295pg6_SY5qznc77&index=6
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 FOURTH YEAR	
Subject Code: BCSML0551	**L T P** **0 0 4**
Subject Name: Machine Learning Lab	**Credits** **2**
Pre- requisites: Basic knowledge of Python and R Programming.	

Course outcome: After completion of this practical, student will be able to:

CO1	Understand the implementation procedures for the machine learning algorithms.	K2
CO2	Identify and apply Machine Learning algorithms to solve real-world problems.	K1
CO3	Examine the requirements on special databases.	K4

List of Practical

List of Practical's		
Sr. No.	**Program Title**	**CO Mapping**
	Data Preprocessing and Feature Selection	CO1
1	Data Preprocessing and Feature Selection on Titanic Dataset • Handle missing values (impute or drop) • Encode categorical variables (LabelEncoder or OneHotEncoder) • Normalize or standardize numerical features • Split dataset into training and testing sets • Perform correlation analysis for feature selection	CO1
	SUPERVISED AND UNSUPERVISED Model Evaluation	**CO2**
2	Regression Techniques on Boston Housing Dataset • Implement Simple Linear Regression (one feature vs. target) • Implement Multiple Linear Regression (all features vs. target) • (Optional) Polynomial Regression for non-linear relationships • Visualize model fits using matplotlib/seaborn • Evaluate models using MSE, RMSE, and R^2 score	CO2
3	Logistic Regression for Binary and Multiclass Classification on Iris Dataset • Binary classification (Setosa vs. Versicolor) using Logistic Regression • Visualize decision boundary • Evaluate accuracy, precision, recall, F1-score • Extend to multiclass classification using One-vs-Rest strategy	CO2

4	Decision Tree Classification (CART & ID3) on Wine Dataset • Train Decision Tree classifiers using DecisionTreeClassifier • Visualize decision tree with plot_tree or graphviz • Perform hyperparameter tuning (max_depth, min_samples_split) using GridSearchCV	CO2
5	Support Vector Machines (SVM) for Classification and Regression • Generate synthetic datasets (make_moons or make_circles) • Train SVM with linear and RBF kernels; visualize decision boundaries • Hyperparameter tuning for C and gamma using cross-validation • Apply SVM on Breast Cancer dataset and evaluate performance • Implement Support Vector Regression (SVR) with linear and RBF kernels	CO2
6	K-Nearest Neighbors (K-NN) Classification • Train K-NN classifier on labeled dataset • Experiment with varying k and distance metrics (Euclidean, Manhattan) • Evaluate with cross-validation and classification metrics (accuracy, precision, recall)	CO2
7	Clustering using K-Means and Expectation-Maximization (EM) • Apply K-Means and Gaussian Mixture Model (EM algorithm) on dataset • Use Elbow Method and Silhouette Coefficient to find optimal clusters • Visualize clusters with scatter plots or pairplots	CO2
	Ensemble Learning	**CO3**
8	Ensemble Learning Methods: Random Forest and Boosting • Train Random Forest classifier; evaluate accuracy, precision, recall • Implement Gradient Boosting and XGBoost; tune hyperparameters • Compare training time, accuracy, overfitting tendencies • Visualize feature importance	CO3
9	Bayesian Classification: Naïve Bayes and Bayesian Networks • Implement Gaussian, Multinomial, and Bernoulli Naïve Bayes classifiers • Evaluate performance with classification metrics • Hyperparameter tuning and feature selection • Introduce Bayesian Belief Networks with small datasets or predefined structures	CO3

Subject Code: BCSE0555		**L T P** 0-0-6
Subject Name: Web Technologies		**Credits** 3
Pre- requisites: Basic Knowledge of any programming language like C/C++/Python/Java. Familiarity with basic concepts of Internet.		
Course Contents/Syllabus		
Unit-1	Introduction to HTML & CSS: **Introduction:** Introduction to Web Technology, 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:** Web Hosting Basics, Types of Hosting Packages, Registering domains, Defining Name Servers, Using Control Panel, Creating Emails in Cpanel, Using FTP Client, Maintaining a Website.	10 hours
Unit-2	Responsive Websites with Bootstrap : **HTML:** What is 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:** Introduction, Tree, Syntax, Elements, Attributes, Namespaces, Display, HTTP request, Parser, DOM, XPath, XSLT, XQuerry, XLink, Validator, DTD, Schema, Server.	14 hours
Unit-3	Introduction to JavaScript and ES6: **Concept of CSS 3:** 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, 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:** Introduction, Bootstrap grid system, Bootstrap Components.	16 hours
Unit-4	Introduction to XML and JSON: **JavaScript Essentials**: Introduction to Java Script , Javascript Types , Var, Let and Const Keywords, Operators in JS , Conditions Statements , Java Script Loops, JS Popup Boxes , JS Events , JS Arrays, Working with Arrays, JS Objects ,JS Functions , Using Java Script in Real time , 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	16 hours

	Difference == & ===, Asynchronous Programming in ES6, Promise Constructor, Promise with Chain, Promise Race.	
Unit-5	Introduction to PHP: Introduction to PHP, Basic Syntax, Variables & Constants, Data Type, Operator & Expressions, Control flow and Decision making statements, Functions, Strings, Arrays. **Working with files and directories:** Understanding file& directory, Opening and closing, a file, Coping, renaming and deleting a file, working with directories, Creating and deleting folder, File Uploading & Downloading. **Session & Cookies:** 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.	16 hours

Sr. No.	Program Title	CO Mapping
1	A.Overview and Installation of various code editors.	CO1
2	B. Overview and Installation of various servers	CO1
3	Implementing HTML program that represent in the document as a start tag, which gives the name and attributes	CO2
4	Implementing HTML program that represents a document	CO2
5	Implementing HTML program to display your simple CV	CO2
6	Creating html document that represents document object model	CO2
7	To Create a table to show your class time table.	CO2
8	Apply various colors to suitably distinguish keywords , also apply font styling like italics, underline and two other fonts to words you find appropriate , also use header tags.	CO2
9	Create a webpage with HTML describing your department use paragraph and list tags	CO2
10	Implementing HTML program that for Heading	CO2
11	Implementing program that implement paragraph and line-break	CO2
12	Use tables to provide layout to your HTML page describing your college infrastructure.	CO2
13	Use and tags to provide a layout to the above page instead of a table layout	CO2
14	Create links on the words e.g. —Wi-Fi and —LAN to link them to Wikipedia pages	CO2

15	Insert an image and create a link such that clicking on image takes user to other page	CO2
16	Change the background color of the page; At the bottom create a link to take user to the top of the page.	CO2
17	Creating HTML program to implement three articles with independent, self-contained content.	CO2
18	Creating a XML document that defines the self-descriptive tags	CO2
19	Designing XML document that store various book data such as: book category, title, author, year and price	CO2
20	To Describe the various types of XML key components	CO2
21	Design XML DTD to define the structure and legal element and attribute of XML document	CO2
22	To implement internal and external DTD	CO2
23	Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.	CO2
24	Design a HTML registration form that takes user name, user password and mobile number with submit button control	CO2
25	Design a HTML5 document that implement of date, number, range, email, search and data list.	CO3
26	Implementation in HTML5 that include native audio and video support without the need for Flash.	CO3
27	Create a simple form to submit user input like his name, age, address and favourite subject, movie and singer.	CO3
28	Add few form elements such as radio buttons, check boxes and password field. Add a submit button at last.	CO3
29	Add CSS property assign a style or behavior to an HTML element such as: color, border, margin and font-style.	CO3
30	Add To Style Text Elements with Font, Size, and Color in CSS	CO3
31	Applying a block element in CSS acquires up the full width available for that content.	CO3
32	Demonstrating the CSS Box model with consists of: borders, padding, margins, and the actual content.	CO3

33	Design a web page by applying CSS grouping and dimensions property.	CO3
34	Design a XML Schema that describes the structure of an XML document.	CO3
35	Design a XML document that describe the well-formed XML document	CO3
36	Design a XML document of CD Catalog through each <CD> element, and displays the values of the <ARTIST> and the <TITLE> elements in an HTML table	CO3
37	Create a XSL document for and taken xml document by you.	CO3
38	Create a XSLT document for and taken xml document by you with all steps	CO3
39	Design a web page by applying CSS Display and Positioning property.	CO3
40	Design a web page by applying CSS Display and Positioning property .	CO3
41	Design a web page by applying CSS pseudo classes.	CO3
42	Creating a Java Script code to implement all data types.	CO4
43	Design a basic structure of Bootstrap Grid system.	CO4
44	Design All Bootstrap Components with example.	CO4
45	Implementing a program in Java script to implement augmented function.	CO4
46	Implementing a program to implement calculator application as real time.	CO4
47	Design a HTML form validation using Java Script.	CO4
48	Write a program to implement Arrow function with default argument in ES6	CO4
49	Implementing a program in ES6 to implement Template string concepts	CO4
50	Implementing a program in ES6 to implement all string methods.	CO4
51	Creating a Java Script program to implement Dialog, Confirm and Message Popup Boxes.	CO4
52	Implementing a Java Script program to implement onClick and onSubmit event	CO4
53	Creating a java script code to implement ‘let’ keyword	CO4
54	Creating a java script code to implement ‘const’ keyword	CO4
55	Implementing a program to implement call back functions in ES6.	CO4
56	Implementing a program for de-structuring of an array in ES6	CO4
57	Javascript code to implement object and class concepts in Typescript.	CO4

58	Write a Typescript program that implement interface and constructor	CO4
59	Write a code in typescript that implement decorator and spread operator	CO4
60	Create a constant by using define() function with its proper syntax	CO4
61	Creating PHP script that return any data types whatever you use.	CO4
62	Implementing a code in Java Script to implement Spread and rest operator	CO4
63	Javascript code that should compile by Typescript compiler as'tsc'	CO4
64	Write a code in typescript that implement Asynchronous Programming concepts.	CO4
65	Write a program in Typescript that implement promise constructor	CO4
66	Implementing promise and chain concepts in Typescript	CO4
67	Write a code in typescript that implement Promise.race() static method.	CO4
68	Crating a program that implement control flow and decision making statement.	CO4
69	Creating PHP to implements parameterized function	CO5
70	Creating program in PHP to store multiple string and concatenate these string and print it.	CO5
71	Write a PHP script to create and delete directory structure	CO5
72	Program to upload and download a file in PHP	CO5
73	Implements single dimension array in PHP	CO5
74	Write a PHP code to open and close a file in a proper manner	CO5
75	Write a PHP script to copying, renaming and deleting a file.	CO5
76	PHP program to create and destroy a session.	CO5
77	PHP program to set and delete a cookie.	CO5
78	PHP program to manually register the session variable	CO5
79	PHP program to manually destroy the session variable	CO5
80	PHP program to store the session data on one page and would be available on second page.	CO5

Course Outcomes – After completion of this course students will be able to:		
CO1	Identify the basic facts and explaining the basic ideas of Web technology and internet.	K1, K2

CO2	Applying and creating various HTML5 semantic elements and application with working on HTML forms for user input.	K3, K6
CO3	Understanding and applyingtheconceptsofCreatingStyleSheetCSS3 and bootstrap.	K2, K3
CO4	Analysing and implementing concept of JavaScript and its applications.	K4, K6
CO5	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

Links: NPTEL/You Tube/Web Link

Unit 1 https://youtu.be/96xF9phMsWA
https://youtu.be/Zopo5C79m2k
https://youtu.be/ZliIs7jHi1s
https://youtu.be/htbY9-yggB0

Unit 2 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		
Subject Code: BCSE0551		**L T P** 0-0-6
Subject Name: SOFTWARE ENGINEERING AND DESIGN		**Credits** 3
Pre- requisites: Basic knowledge of computer fundamentals and software development processes.		
Course Contents/Syllabus		
Unit-1	Introduction and Development models : 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, Kanban framework.	8 hours
Unit-2	Software Requirement Quality Assurance: 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.	8 hours
Unit-3	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.	8 hours
Unit-4	Software Testing: Testing Objectives, 7 Principles 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 (White Box Testing Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha, and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards, Test Management, Test Planning and Estimation, Test Monitoring and Control, Configuration Management, Risks and Testing, Defect Management, Tool Support for Testing, Effective Use of Tools.	8 hours

Unit-5	Project Maintenance and Management Concepts: Software Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Need for Maintenance. 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 technique, staffing level estimation, team structures, risk analysis and management. Configuration Management, Software reengineering, reverse engineering, restructuring forward engineering, Clean Room software engineering. Case Tools.	8 hours

List of Practical

Sr. No.	Program Title	CO Mapping
1	Team formation and allotment of Mini project: Problem statement, Literature survey, Requirement. analysis.	CO1
2	Draw the use case diagram	CO2
3	Draw the Data Flow Diagram (DFD): All levels.	CO2
4	Design an ER diagram for with multiplicity	CO2
5	Prepare SRS document in line with the IEEE recommended standards.	CO2
6	Draw State chart diagram.	CO3
7	Draw Object and Class diagram.	CO3
8	Create Interaction diagram: sequence diagram for SDD	CO3
9	Create Interaction diagram: collaboration diagram for SDD.	CO3
10	Create Activity diagram	CO3
11	Create Component diagram	CO3
12	Create Deployment diagram	CO3
13	Estimation of Test Coverage Metrics and Structural Complexity.	CO4
14	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on boundary-value analysis, execute the test cases, and discuss the results	CO4

15	Design, develop, code, and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases, and discuss the test results.	CO4
16	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on equivalence class partitioning, execute the test cases, and discuss the results.	CO4
17	Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on decision-table approach, execute the test cases, and discuss the results.	CO4
18	Create test cases for a program which determine whether an integer is prime or not by using path testing.	CO4
19	Create test cases for a program which determine whether an integer is prime or not by using Cyclomatic complexity.	CO4
20	Consider a program to input two numbers and print them in ascending order. Find all du paths and identify those du-paths that are not feasible. Also find all dc paths and generate the test cases for all paths (dc paths and non dc paths).	CO4
21	Consider the code to arrange the nos. in ascending order. Generate the test cases for loop coverage and path testing. Check the adequacy of the test cases through mutation testing and compute the mutation score for each.	CO4
22	Write Test cases for any Known Application (e.g., Banking Application)	CO4
23	Create a test plan document for any application (e.g., Library Management System)	CO4
24	Study of any testing tool (e.g., Win Runner)	CO4
25	Study of any bug tracking tool (e.g., Bugzilla, Bug bit)	CO4
26	Study of any test management tool (e.g., Test Director)	CO4
27	Study of any open source-Testing tool (e.g., Test link, Test Rail)	CO4

28	Study of any web testing tool (e.g., Selenium)	CO4
29	Mini Project with CASE tools.	CO5
30	Case Study Provided by Industry.	CO5

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

CO1	Understand various software characteristics and analyze different software Development Models	K4
CO2	Demonstrate the concept of SRS and apply basic software quality assurance practices.	K3
CO3	Understand design principles and logic to effectively compare various software design methods.	K4
CO4	Apply various testing techniques.	K3
CO5	Maintain and apply software project management tools for software development.	K5

Text Books:

4. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers 3RDEdition.
5. RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill. 7thEdition.
6. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.4th Edition.

Reference Books:

4. Pankaj Jalote, Software Engineering, Wiley.
5. Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication. 2nd Edition.
6. Kassem Saleh, “Software Engineering”, Cengage Learning.
7. Ian Summerville, Software Engineering, Addison Wesley. 9th Edition.

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=bLrbX4ZCQeY

https://www.youtube.com/watch?v=ZloPeQA1G4E

https://www.youtube.com/watch?v=rpk7fSkTIu8
https://www.youtube.com/watch?v=T0TynxN77oY
https://www.youtube.com/watch?v=nulFv99VBGs

B.TECH THIRD YEAR		
Subject Code: BCSAI0513		**L T P** 3-0-0
Subject Name: Introduction to Artificial Intelligence		**Credits** 3
Pre- requisites: Basic Knowledge of Transform techniques		
Course Contents/Syllabus		
Unit-1	Introduction : Introduction to Artificial Intelligence, Historical developments of Artificial Intelligence, well defined learning problems, Designing a Learning System, Basics of problem-solving: problem representation paradigms, state space, Problem reduction, Constraint satisfaction, Applications of AI	8 hours
Unit-2	SEARCH TECHNIQUES: Searching for solutions, Uninformed Search Strategies: DFS, BFS, Informed Search Strategies: Local search algorithms and optimistic problems, adversarial Search, Search for games, minimax, Alpha - Beta pruning, Heuristic Search techniques, Hill Climbing, Best-first search, Means Ends Analysis, Iterative deepening Heuristic Search and A*.	8 hours
Unit-3	LOGIC AND KNOWLEDGE REPRESENTATION : Introduction of Logic, Propositional Logic Concepts, Semantic Tableaux and Resolution in Propositional logic, FOPL, Semantic Tableaux and Resolution in FOPL, Logic Programming in Prolog. Production systems and rules for some AI problems: Water Jug Problem, Missionaries-Cannibals Problem, n-Queen problem, monkey banana problem, Travelling Salesman Problem. Knowledge representation, semantic nets, partitioned nets, parallel implementation of semantic nets. Frames, Common Sense reasoning and thematic role frames.	8 hours
Unit-4	EXPERT SYSTEM : Architecture of knowledge-Based System, Rule-based systems, Forward and Backward Chaining, Frame Based systems. Architecture of Expert System, Agents and Environment, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.	8 hours
Unit-5	PLANNING & UNCERTAINTY : Planning with state Space Search, Conditional Planning, Continuous planning, Multi-Agent Planning, Forms of learning, inductive learning, Reinforcement Learning, learning decision trees, Neural Net learning and Genetic learning. Probabilistic Methods, Bayesian Theory, Dempster Shafer Theory, Bayes Network. 19 Evolutionary computations: Swarm Intelligence, ant colony optimization Agents, Intelligent Agents, Structure of Intelligent Agents, Virtual Agents, Multi-agent systems. Case Study: Health Care, E Commerce, Smart Cities.	8 hours
Course Outcomes – After completion of this course students will be able to:		
CO1	After completion of this course students will be able to Understand fundamental understanding of the history of artificial intelligence (AI) and its foundations	K2

CO2	Apply principles of AI in solutions that require problem solving, inference and perception.	K3
CO3	Explain strong familiarity with a number of important AI techniques, including in particular intelligent search methods and solutions	K3
CO4	Apply the concepts of knowledge & reasoning of predicate logic and representing knowledge using rules, Probabilistic reasoning	K3
CO5	Assess/ Evaluate critically the techniques presented and apply them to real world problems	K5

Text Books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education. Fourth Edition 2021.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill 3rdEdition 2010.

Links: NPTEL/You Tube/Web Link

https://nptel.ac.in/courses/106/106/106106198/

https://nptel.ac.in/courses/111/107/111107137/

https://nptel.ac.in/courses/106/106/106106202/

https://nptel.ac.in/courses/106/106/106106213/

https://nptel.ac.in/courses/106/105/106105152/

B.TECH THIRD YEAR		
Subject Code: BCSAI0522		**L T P** 3-0-0
Subject Name: Image Processing and Pattern Recognition		**Credits** 3
Pre- requisites: Basic knowledge of mathematics (linear algebra, probability), digital logic, data structures, programming and general idea of image acquisition & analysis.Basic Knowledge of Transform techniques		
Course Contents/Syllabus		
Unit-1	Introduction to Image Processing and Image Formation: Image processing systems and its applications, Basic image file formats, Geometric and photometric models; Digitization - sampling, quantization; Image definition, its representation and neighbourhood metrics.	8 hours
Unit-2	Intensity transformations & spatial filtering: Enhancement, contrast stretching, histogram specification, local contrast enhancement; Smoothing, linear and order statistic filtering, sharpening, spatial convolution, Gaussian smoothing, DoG, LoG.	8 hours
Unit-3	Image Segmentation and Image/Object Features Extraction: Pixel classification; Grey level thresholding, global/local thresholding; Optimum thresholding - Bayes analysis, Otsu method; Derivative based edge detection operators, edge detection/linking, Canny edge detector; Region growing, split/merge techniques, line detection, Hough transform, Textural features - gray level co-occurrence matrix; Moments; Connected component analysis; Convex hull; Distance transform, medial axis transform, skeletonization/thinning, shape properties	8 hours
Unit-4	Image Registration: Mono-modal/multimodal image registration; Global/local registration; Transform and similarity measures for registration; Intensity/pixel interpolation.	8 hours
Unit-5	Colour image processing & morphological filtering basics: Fundamentals of different colour models - RGB, CMY, HSI, YCbCr, Lab; False colour; Pseudo colour; Enhancement; Segmentation, Dilation and Erosion Operators, Top Hat Filters	8 hours

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

CO1	Understand the concept of image processing and its techniques.	K2
CO2	Explain and exemplify spatial filtering and intensity transformation	K2
CO3	Understand Image Segmentation and features extraction techniques.	K2
CO4	Analyze different image registration types.	K4
CO5	Illustrate color image processing techniques and doing morphological filtering.	K3

Text Books:

1. Digital Image Processing. R. C. Gonzalez and R. E. Woods, Prentice Hall.
Reference Books:
1. Image Processing: The Fundamentals. Maria Petrou and Panagiota Bosdogianni, John Wiley & Sons, Ltd.
2. Digital Image Processing. K. R. Castleman:, Prentice Hall, Englewood Cliffs.
3. Visual Reconstruction. A. Blake and A. Zisserman, MIT Press, Cambridge
Links: NPTEL/You Tube/Web Link
https://www.youtube.com/watch?v=Y_-HgmvF9Zc https://www.youtube.com/watch?v=MiSS_aEEf8w
https://www.youtube.com/watch?v=F3ZvWQMyj4I
https://www.youtube.com/watch?v=onWJQY5oFhs
https://www.youtube.com/watch?v=ecu8kreTwYM
https://www.youtube.com/watch?v=7ImSbCj8bRI https://www.youtube.com/watch?v=yKFaHFwTg00

B.TECH THIRD YEAR		
Subject Code: BCS0511		**L T P** 3-0-0
Subject Name: Introduction To Cloud Computing		**Credits** 3
Pre- requisites: Adequate knowledge of Basics of Computers, networking and client server concept.		
Course Contents/Syllabus		
Unit-1	CLOUD COMPUTING AND ITS INFRASTRUCTURE: Introduction to Cloud Computing, Definition of Cloud, Evolution of Cloud Computing, Underlying Principles of Parallel and Distributed Computing, Cloud Characteristics, Scalability & Elasticity in Cloud, On-demand Provisioning, EC2 Instances and its types, Cloud economics.	8 hours
Unit-2	CLOUD VIRTUALIZATION BASICS: Service Oriented Architecture, REST, Systems of Systems, Web Services, Publish Subscribe Model, Basics of Virtualization, Types of Virtualizations, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, Virtualization of CPU, Memory – I/O Devices, Virtualization Support and Disaster Recovery, networking fundamentals.	8 hours
Unit-3	CLOUD COMPUTING REFERENCE ARCHITECTURES: Layered Cloud Architecture Design, NIST Cloud Computing Reference Architecture, Public, Private and Hybrid Clouds – laaS – PaaS – SaaS, Introduction to Cloud Computing Reference Architecture (CCRA), Benefits of CCRA, Architecture Overview – The conceptual Reference Model, Cloud Consumer, Cloud provider, Cloud Auditor, Cloud carrier, Scope of control between Provider and Consumer.	8 hours
Unit-4	COMPONENTS OF CLOUD ARCHITECTURE: CCRA: Architectural Components – Service deployment, Service Orchestration, Cloud Service Management, Security, Cloud Taxonomy. IBM's Cloud Computing Reference Architecture (CCRA 2.0) – Introduction, Roles, Architectural Elements, CCRA Evolution. Migration to Cloud Storage, Storage Services, Elastic Block Storage, Elastic File Storage, S3, RDS, DynamoDB, load balancing services.	8 hours
Unit-5	RESOURCE MANAGEMENT & CLOUD SECURITY: Inter Cloud Resource Management, Resource Provisioning and Resource Provisioning Methods, Global Exchange of Cloud Resources, Networking Fundamentals – VPC, Subnets, Routing, Security Groups, DNS, Direct Connect, VPC Endpoints, Security Overview – Cloud Security Challenges, Software-as-a-Service Security, Security Governance, Virtual Machine Security, IAM, Security Standards, VPC.	8 hours

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

CO1	Understand the fundamentals of cloud computing and computing techniques.	K2
CO2	Understand the concepts of virtualization and service-oriented architecture thoroughly.	K6
CO3	Examine various cloud computing architectures available.	K3
CO4	Understand and analyze different components and virtual storage solutions.	K4
CO5	Analyze the resource provisioning methods and cloud security solutions.	K5

Text Books:

1. Ritting house, John W., And James F. Ransome, ―Cloud Computing: Implementation, Management And Security, CRC Press, 2017.
2. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed And Cloud Computing, From Parallel Processing To The Internet Of Things", Morgan Kaufmann Publishers, 2013.
3. Raj kumarBuyya, Christian Vecchiola, S. Thamaraiselvi, ―Mastering Cloud Computing, Tata Mcgraw Hill, 2013.

Reference Books:

1. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing – A Practical Approach, Tata Mcgraw Hill, 2009.
2. George Reese, "Cloud Application Architectures: Building Applications And Infrastructure In The Cloud: Transactional Systems For EC2 And Beyond (Theory In Practice), O'Reilly, 2009.

Links: NPTEL/You Tube/Web Link

https://docs.aws.amazon.com/EC2

https://docs.aws.amazon.com/vpc

https://docs.aws.amazon.com/vpcEndpoint

https://docs.aws.amazon.com/S3

https://docs.aws.amazon.com/Security

B.TECH THIRD YEAR		
Subject Code: BCSAI0520		**L T P** 3-0-0
Subject Name: Cloud Virtualization		**Credits** 3
Pre- requisites: Adequate knowledge of Basics of Cloud Computing and its architecture covered through courses prior to this semester.		
Course Contents/Syllabus		
Unit-1	CLOUD AND VIRTUALIZATION: 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.	8 hours
Unit-2	VIRTUALIZATION ARCHITECTURE:rchitecture 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.	8 hours
Unit-3	AWS VIRTUAL INFRASTRUCTURE: 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.	8 hours
Unit-4	CLOUD STORAGE AND MIGRATION SOLUTIONS: 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.	8 hours
Unit-5	CLOUD SECURITY & VIRTUALIZED SOLUTIONS: 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.	8 hours
Course Outcomes – After completion of this course students will be able to:		
CO1	Understand the fundamentals and core of Virtualization	K2
CO2	Create Virtual Machines (VM) and compute instances of various configurations.	K6
CO3	Develop virtual private connection using various network virtualization techniques	K3
CO4	Understand and analyze virtual storage solutions for various usages.	K4
CO5	Analyze cloud security solutions and monitoring tools to evaluate the performance of cloud resources.	K5

Text Books:

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: NPTEL/You Tube/Web Link

https://acloud.guru/
https://nptel.ac.in/courses/106105167

https://aws.amazon.com/
https://nptel.ac.in/courses/106105223

https://docs.aws.amazon.com/vpc https://docs.aws.amazon.com/ElasticBeanstalk
https://docs.aws.amazon.com/EC2

https://docs.aws.amazon.com/S3

https://docs.aws.amazon.com/Security
https://docs.aws.amazon.com/CloudWatch

B.TECH THIRD YEAR		
Subject Code: BCSE0511		**L T P** 3-0-0
Subject Name: CRM Fundamentals		**Credits** 3
Pre- requisites:		
Course Contents/Syllabus		
Unit-1	Introduction: 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.	8 hours
Unit-2	CRM Strategy and Framework: 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.	8 hours
Unit-3	Solution Design and Architecture: 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.	8 hours
Unit-4	CRM for Business: 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.	8 hours
Unit-5	CRM implementation: 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.	8 hours

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

CO1	Understand the basic concepts of Customer relationship management.	K1, K2
CO2	To understand strategy and framework of Customer relationship management.	K2
CO3	Learn basics of Cloud Based Customer relationship management.	K1
CO4	Understand Customer relationship management in context with business use cases.	K3

CO5	Understand implementation basics of CRM.	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

Links: NPTEL/You Tube/Web Link

https://onlinecourses.nptel.ac.in/noc20_mg57/preview

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

B.TECH THIRD YEAR		
Subject Code: BCSE0513		**L T P** 3-0-0
Subject Name: CRM Adminstration		**Credits** 3
Pre- requisites: Creative thinking and which is being used by the creative talent in your business areas.		
Course Contents/Syllabus		
Unit-1	Introduction: 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.	8 hours
Unit-2	Lightning & Salesforce App Experience Customization: Formula and Validation, Accounts and Contacts for Lightning Experience, Lead and Opportunity for Lightning Experience, Product Quotes and Contracts, Campaign Basic.	8 hours
Unit-3	Salesforce Administration: 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.	8 hours
Unit-4	Lightning Experience: 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.	8 hours
Unit-5	Learn Admin Essentials in Lightning Experience: 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.	8 hours

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

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

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
Links: NPTEL/You Tube/Web Link
www. Trailhead.salesforce.com
www.mindmajix.com/salesforce-tutorial
www,youtube.com/watch?v=7K42geizQCI

B.TECH THIRD YEAR		
Subject Code: BCSE0512		**L T P** 3-0-0
Subject Name: Python Web Development With Django		**Credits** 3
Pre- requisites: Students should have good knowledge of Python Programming and Python coding experience.		
Course Contents/Syllabus		
Unit-1	Python libraries for web development: 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.	8 hours
Unit-2	Introduction to Django Framework: 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.	8 hours
Unit-3	Integrating Accounts & Authentication on Django: 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.	8 hours
Unit-4	Connecting SQLite with Django: 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.	8 hours
Unit-5	Connecting SQLite with Django: 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.	8 hours
Course Outcomes – After completion of this course students will be able to:		
CO1	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
CO2	Demonstrate web application framework i.e. Django to design and implement typical dynamic web pages and interactive web based applications.	K3, K6
CO3	Implementing and analyzing the concept of Integrating Accounts & Authentication on Django.	K3, K4
CO4	Understand the impact of web designing by database connectivity with SQLite in the	K2, K3

	current market place where everyone uses to prefer electronic medium for shoping, commerce, and even social life also.	
CO5	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. 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.

Links: NPTEL/You Tube/Web Link

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

https://youtu.be/F5mRW0jo-U4
https://youtu.be/yD0_1DPmfKM?list=PLQVvvaa0QuDe9nqlirjacLkBYdgc2inh3
https://youtu.be/rHux0gMZ3Eg
https://youtu.be/jBzwzrDvZ18 https://youtu.be/RiMRJMbLZmg

https://youtu.be/8DF1zJA7cfc
https://youtu.be/CTrVDi3tt8o https://youtu.be/FzGTpnI5tpo
https://youtu.be/z4lfVsb_7MA https://youtu.be/WuyKxdLcw3w

https://youtu.be/UxTwFMZ4r5k https://youtu.be/2Oe55iXjZQI
https://youtu.be/zV8GOI5Zd6E https://youtu.be/uf2tdzh7Bq4
https://youtu.be/RzkVbz7Ie44

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	
Subject Code: BCSE0514	**L T P** 3-0-0
Subject Name: Desgin Pattern	**Credits** 3

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

Course Contents/Syllabus

Unit-1	Introduction: 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.	8 hours
Unit-2	Creational Design Patterns: Creational Patterns: Abstract Factory, Builder, Factory Pattern, Prototype Pattern, Singleton pattern.	8 hours
Unit-3	Structural Design Pattern on Django: Structural Pattern Part-I, Adapter, Bridge, Composite. Structural Pattern Part-II, Decorator Pattern, Façade Pattern, Flyweight Pattern, Proxy Pattern.	8 hours
Unit-4	Behavioural Design Pattern – 1: Behavioural Patterns Part: I, Chain of Responsibility Pattern, Command Pattern, Interpreter Pattern, Iterator Pattern. Behavioural Patterns Part: II, Mediator, Memento, Observer Pattern.	8 hours
Unit-5	Behavioural Design Pattern – II : Behavioural Patterns Part: III, State Patterns, Strategy, Template Patterns, Visitor, Expectation from Design Patterns.	8 hours

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

CO1	Construct a design consisting of a collection of modules.	K2, K6
CO2	Exploit well-known design patterns (such as Iterator, Observer, Factory and Visitor)	K4, K5
CO3	Distinguish between different categories of design patterns	K4
CO4	Ability to understand and apply common design patterns to incremental/iterative Development	K2, K6
CO5	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
Links: NPTEL/You Tube/Web Link
https://youtu.be/C_oPLDaSy-8
https://youtu.be/NU_1StN5Tkk

B.TECH THIRD YEAR		
Subject Code: BNC0501/BNC0601		**L T P** 3-0-0
Subject Name: Constitution Of India, Law And Engineering		
Pre- requisites: 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.		
Course Contents/Syllabus		
Unit-1	Introduction and basic information about Indian Constitutions: 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.	8 hours
Unit-2	Union Executive and State Executive: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.	8 hours
Unit-3	Introduction and Basic Information about Legal System: 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.	8 hours
Unit-4	Intellectual Property Laws and Regularization to Information: 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	8 hours

	Appellate Tribunal, Offences, Limitations of the Information Technology Act.	
Unit-5	Business Organizations and E-Governance: Sole Traders, Partnerships: Companies: The ompany'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.	8 hours

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

CO1	Identify and explore the basic features and modalities about Indian constitution.	K1
CO2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.	K2
CO3	Differentiate different aspects of Indian Legal System and its related bodies.	K4
CO4	Discover and apply different laws and regulations related to engineering practices.	K4
CO5	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		
Subject Code: BNC0502/BNC0602		**L T P** 3-0-0
Subject Name: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE		
Pre- requisites: Computer Organization and Architecture		
Course Contents/Syllabus		
Unit-1	Society State and Polity In India: 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.	8 hours
Unit-2	Indian Literature, Culture, Tradition, and Practices: 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	8 hours
Unit-3	Indian Religion, Philosophy, and Practices: 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.	8 hours
Unit-4	Science, Management and Indian Knowledge System: 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..	8 hours
Unit-5	Cultural Heritage and Performing Arts: 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.	8 hours

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. 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

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=LX_b2M3IzN8

https://www.youtube.com/watch?v=LnbvhoxHn8M

https://www.youtube.com/watch?v=ddM9AcreVqY

https://www.youtube.com/watch?v=uwoD5YsGACg

https://www.youtube.com/watch?v=bTwYSA478eA&list=PLJ5C_6qdAvBH01tVf0V4PQsCxGE3hSqEr
https://www.youtube.com/watch?v=tSodBEAJz9Y

B.TECH THIRD YEAR	
Subject Code: BCSE0602	**L T P** 3-1-0
Subject Name: COMPUTER NETWORKS	**Credits** 4

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-1	INTRODUCTION: 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.	10 hours
Unit-2	Data Link Layer: 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.	10 hours
Unit-3	Network Layer: Point-to-point networks, Logical addressing, Basic internetworking (IP, CIDR, ARP, RARP, DHCP, ICMP). IPv4 and IPv6. Routing, forwarding and delivery, Static and dynamic routing, Routing algorithms and protocols, Congestion control algorithms.	10 hours
Unit-4	Transport Layer: Process-to-process delivery, Transport layer protocols (UDP and TCP). Connection management, Flow control and retransmission. Window management, TCP Congestion control, Quality of service.	8 hours
Unit-5	Application Layer: 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.	10 hours

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

CO1	Build an understanding of the fundamental concepts and Layered Architecture of computer networking.	K2, K6
CO2	Understand the basic concepts of link layer properties to detect error and develop the solution for error control and flow control.	K2, K6
CO3	Design, calculate, and apply subnet masks and addresses to fulfil networking requirements and calculate distance among routers in subnet.	K3, K4, K6
CO4	Understand the duties of transport layer, Session layer with connection management of TCP protocol.	K2, K4
CO5	Discuss the different protocols used at application layer.	K2

Text Books:

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

Reference Books:

2. Kurose and Ross, “Computer Networking- A Top-Down Approach”, Eighth Edition-2021, Pearson.
5. Peterson and Davie, “Computer Networks: A Systems Approach”, Fourth Edition-1996, Morgan Kaufmann

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https://www.youtube.com/watch?v=LX_b2M3IzN8

https://www.youtube.com/watch?v=LnbvhoxHn8M

https://www.youtube.com/watch?v=ddM9AcreVqY

https://www.youtube.com/watch?v=uwoD5YsGACg

https://www.youtube.com/watch?v=bTwYSA478eA&list=PLJ5C_6qdAvBH01tVf0V4PQsCxGE3hSqEr

https://www.youtube.com/watch?v=tSodBEAJz9Y

B.TECH THIRD YEAR		
Subject Code: BCSE0651		**L T P** 0-0-6
Subject Name: ADVANCED JAVA PROGRAMMING		**Credits** 3
Pre- requisites: Basic knowledge of Core Java (OOP, exception handling, collections), multithreading, and fundamentals of SQL/database operations.		
Course Contents/Syllabus		
Unit-1	Jdbc: Introduction, JDBC Driver, DB Connectivity, Connection, Statement, Result Set, Prepared Statement, Transaction Management, Stored Procedures. Servlet: Servlet Overview, Servlet Life Cycle, Servlet API, Generic Servlet, HTTP Servlet, Redirect requests to other resources using Request Dispatcher, send Redirect, Session Tracking: Using cookies, URL rewriting, and HTTP Session.	14 hours
Unit-2	JSP: Introduction, Life Cycle of JSP, JSP to Servlet Conversion, JSP Scripting Elements , JSP Implicit Objects, JSP Directives, Expression Language, Exception Handling in JSP, Servlet-JSP-JDBC Integration, Login and registration system using JSP and Servlet.	14 hours
Unit-3	Spring: Overview of Spring Ecosystem, Spring Modules, IOC container, Types of Dependency Injection (DI): Constructor Injection Setter Injection, Field Injection, Configuration Approaches: Java-based Configuration, Component Scanning, Annotation-based Configuration, Spring JDBC, Spring Project Setup using Maven.	14 hours
Unit-4	Spring MVC: Overview of Spring MVC architecture, Controllers in Spring MVC, Passing Data Between Controller and View, JSP in Spring MVC, Integration with Spring JDBC. Spring Boot: Introduction, Creating a Spring Boot project using Spring Initializer, Spring Boot Annotations & Auto Configuration, Spring Data JPA and H2 setup, Serving HTML pages and static content, Handling HTTP methods, Project Lombok	15 hours
Unit-5	JPA: Introduction to ORM & JPA, JPA Annotations, JPA Relationships, RESTful API, CRUD with Spring Data JPA, Repository Interfaces: JpaRepository, CrudRepository, JSON/XML handling, Postman testing and deployment, Introduction to spring AI**.**	15 hours

List of Practical		
Sr. No.	**Program Title**	**CO Mapping**

1	Install a database (MySQL or Oracle). Program to illustrate JDBC connectivity. Program for maintaining database by sending queries.	CO1
2	Write program to create a demo table emp having fields is, name, city and insert two rows by using JDBC.	CO1
3	Write a Java program using Statement to create a table Students with fields id, name, age, and grade.	CO1
4	Write a Java program using Statement to insert multiple records into the Students table	CO1
5	Write a Java program to demonstrate a money transfer transaction between two bank accounts. Ensure that both debit and credit operations are either committed together or rolled back in case of an error.	CO1
6	Write a Java program using PreparedStatement to delete student records where grade is below a given threshold.	CO1
7	Write a Java program using PreparedStatement to insert multiple records efficiently using batch execution.	CO1
8	Write a Java program to call a stored procedure that calculates the total salary of employees in a given department.	CO1
9	Implement a java program using TCL statements commit (), rollback(), setAutoCommit(), setSavepoint(), and releaseSavepoint() method on Employee table.	CO1
10	Write a servlet program to select the details of an employee (emp id, empname, empadd,empphone) and display on browser in appropriate format.	CO1
11	Write a GenericServlet to handle employee registration. The servlet should: Accept employee details (name, email, designation, salary) via a form (POST request).Store the details in a database (use JDBC). Display a success message after successful insertion.	CO1
12	Implement a servlet program that receive two inputs Name and Password from HTML page and display on the browser.	CO1
13	Implement a servlet program that redirect a request to Google.com.	CO1
14	Implement session handling concept by using HTTPSession object.	CO1
15	Implement session handling concept by using URL rewriting method.	CO1
16	Create a servlet Program which displays cookie id with the help of session handling concepts.	CO1
17	Implement a program that takes three input as: User Name, User Password and User Mobile from html form and access these data by using servlet also display these details on browser.	CO1
18	Implement a servlet program to select the details of an employee (emp id, empname, empadd, empphone) and display on browser in appropriate format.	CO1
19	Implement a program to add any data on cookies and also access these data from cookies.	CO1
20	Implement servlet a program to implement the redirection of any request to other resources such as an html file.	CO1
21	Create a table which should contain at least the following fields: name, password, email-id, phone number Implement a java program/servlet/JSP to connect to that	CO1

	database and extract data from the tables and display them. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.	
22	Design and implement a simple servlet book query such as book_id, book_name, book_author and published date with the help of JDBC & SQL. Create on ODBC/latest driver link, Compile & Execute JAVA JDBC Socket.	CO1
23	Design a simple application program using Servlet and Database 1. Simple login form 2. Customer Feedback Form 3. Admission Form 4. Student Mark Sheet	CO1
24	Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Implement a servlet for doing the following. Create a Cookie and add these four-user id's and passwords to this Cookie.2. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies.	CO1
25	Implement all JSP scripting element (scriptlet, expression and declaration).	CO2
26	Implement all JSP directive element (page, include and taglib).	CO2
27	Implement JSP program that calculates factorial values for an integer number, while the input is taken from an HTML form	CO2
28	Implement a JSP program for displaying basic arithmetic functions that calculates Powers of 2 for integers in the range 0-10.	CO2
29	Implement a JSP (EmpBeanTest.jsp) page that illustrates how to access a JavaBean class by using all required action tags from a JSP page.	CO2
30	Implement a JSP program to display strings that shows a sample order form in restaurant.	CO2
31	Implement a JSP program to upload file into server.	CO2
32	Implement a JSP program to count no. of visitors once user clicks on submit button on webpage.	CO2
33	Implement a JSP program to illustrate session tracking for printing the string array (color) through index.jsp page and print the length of the selected color through another page print.jsp.	CO2
34	Implement a JSP program for arithmetic exception error handling by using html page, jsp page, and errorPage, isErrorPage directives.	CO2
35	Implement a JSP program to display current date & time of your system.	CO2
36	Implement a JSP page to retrieve data from HTML into JSP and display information on browser.	CO2
37	A company's recruitment portal requires candidates to register before applying for jobs. Design a JSP page for registration and a Servlet to store user details in a MySQL database using JDBC. How would you implement session management in a JSP-based web application to keep users logged in across multiple pages?	CO2
38	Implement a JSP program to validate username and password in sample order form.	CO2
39	Implement a JSP program to select record from database Employee.	CO2

40	Implement a JSP which insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user's name and password from the database. Design and implement a simple shopping cart example with session tracking API.	CO2
41	Program: Create a simple Spring project using Maven that prints a welcome message using a Spring Bean. Concept: Introduction to Spring Ecosystem and Bean creation.	CO3
42	Program: Demonstrate the use of ApplicationContext as IOC container to load beans. Concept: Spring IOC container usage.	CO3
43	Program: Define multiple Spring Beans and manage them using XML-based configuration. Concept: Spring Modules and IOC in action.	CO3
44	Program: Demonstrate Constructor-based DI in Spring. Concept: Injecting dependencies using constructor.	CO3
45	Program: Implement Setter-based DI to inject a service bean into another. Concept: Using setters for bean wiring.	CO3
46	Program: Demonstrate Field Injection using @Autowired annotation. Concept: Simplified DI using annotations.	CO3
47	Program: Configure beans using Java-based configuration with @Configuration and @Bean. Concept: Pure Java Spring configuration.	CO3
48	Program: Use Component Scanning and @Component, @Service, @Repository. Concept: Auto-detection of components.	CO3
49	Program: Demonstrate Annotation-based configuration with full @Configuration and @ComponentScan. Concept: Clean and scalable configuration.	CO3
50	Program: Create a simple JDBC DAO using Spring JDBC Template to fetch data from H2 database. Concept: Spring JDBC template integration.	CO3
51	Program: Implement Insert and Update operations using Spring JDBC. Concept: Data manipulation using Spring.	CO3
52	Program: Handle exceptions and use Row Mapper with Spring JDBC for object mapping. Concept: Robust data access layer.	CO3
53	Program: Set up a Maven project structure for a Spring app and manage dependencies using pom.xml. Concept: Maven-based project setup.	CO3
54	Program: Integrate external dependency (like MySQL connector) and test project compilation. Concept: Dependency management in Maven.	CO3
55	Program: Create a modular app with User Service, injected via constructor, and use annotations (@Component, @Autowired). Concept: Real-world DI and service layer architecture.	CO3
56	Program: Develop a full Spring app managing user profiles with Component Scanning, Java-based Config, JDBC for persistence, tested via H2 DB. Concept: Case Study combining all concepts into one application.	CO3
57	Case Study: Develop a Spring application utilizing Dependency Injection, component	CO3

	scanning, and annotation-based configuration within a Maven-based setup	
58	You are designing a web application for an online bookstore. Set up a basic Spring MVC structure with Dispatcher Servlet, controller, and view." Program Goal: Create a minimal Spring MVC app showing folder structure and web.xml setup.	CO4
59	Build a feedback page for a college portal. Create a Spring MVC controller that returns a welcome message on accessing /feedback." Program Goal: Implement a basic controller class using @Controller and map a simple GET request.	CO4
60	In a product catalog system, pass a product's name and price from the controller to the view for display." Program Goal: Use Model or ModelMap in the controller to send data to JSP.	CO4
61	"Create a login form where the user inputs their username. Display a welcome message using data passed from the form." Program Goal: Use @RequestParam to capture form input and display it in JSP. ary key.	CO4
62	Build a registration form for students and bind form data to a Student object." Program Goal: Use @ModelAttribute to map form fields to a model bean.	CO4
63	In a tourism site, display a list of popular destinations in a JSP page returned from a controller." Program Goal: Configure JSP view resolution in spring-servlet.xml and use JSTL to display dynamic content.	CO4
64	Create a feedback form where name and message fields are mandatory. Validate the form input and show error messages." Program Goal: Use Spring Form tag library and BindingResult to perform simple validation.	CO4
65	Design a student records system that fetches student data from a MySQL database and displays it using Spring MVC." Program Goal: Connect Spring MVC to a database using Spring JDBC and show data in a JSP.	CO4
66	Case: "Your team is building a microservice for user registration. Initialize a basic Spring Boot application structure." Program Goal: Use @SpringBootApplication, run the app, and understand the auto-configured structure.	CO4
67	Case: "You want to quickly start a RESTful service for a contact book using Spring Initializr." Program Goal: Generate a Spring Boot project with Spring Web and Spring Boot DevTools.	CO4
68	Case: "In a university portal, configure a controller without any XML and rely on auto-configuration." Program Goal: Use @RestController, @RequestMapping, and rely on application.properties.	CO4
69	Case: "Build a student management module that stores data in an in-memory H2 database." Program Goal: Integrate Spring Data JPA with H2, create an entity, repository, and test data storage.	CO4

70	Case: "Your library website needs to show a homepage with contact info and a static banner." Program Goal: Serve HTML from /templates and static images/CSS from /static.	CO4
71	Case: "Create a contact form submission endpoint. Use GET to load the form and POST to save data." Program Goal: Implement separate methods for @GetMapping and @PostMapping.	CO4
72	Case: "You want to reduce boilerplate in your Book class (getters, setters, constructors)." Program Goal: Use @Data, @NoArgsConstructor, @AllArgsConstructor from Lombok.	CO4
73	Case: "Develop a course catalog system that allows adding, listing, updating, and deleting courses." Program Goal: Build full CRUD using Spring Boot, Spring Data JPA, H2, and REST endpoints.	CO4
74	You are designing a simple library system. Begin by creating an entity Book and use JPA to persist data to a relational database.	CO4
75	In a school database system, annotate an @Entity class Student with appropriate JPA annotations like @Id, @GeneratedValue, @Column.	CO4
76	In a hospital management system, create a one-to-one relationship between Patient and Medical Record using JPA	CO4
77	Implement CRUD operations on MYSQL database using spring data rest with POSTMAN client.	CO5
78	Implement CRUD operations on POSTGRESQL database using spring data rest with POSTMAN client.	CO5
79	Develop a system for online courses where one Instructor can have many Courses. Model this using JPA annotations.	CO5
80	Build a college management system where Students can enroll in multiple Courses. Implement many-to-many using JPA.	CO5
81	In a retail system, expose CRUD operations for Product entity using Spring Boot REST API.	CO5
82	Develop an employee management system that performs Create, Read, Update, and Delete operations using JpaRepository	CO5
83	In a book store app, compare the use of CrudRepository vs. JpaRepository for managing Book entities	CO5
84	In a weather app, build an API that serves both JSON and XML responses using appropriate Spring annotations	CO5
85	After building a student API, demonstrate how to test CRUD endpoints using Postman including headers and body format	CO5
86	Once your API is ready, deploy the project on localhost using Spring Boot and test endpoints in a browser or Postman	CO5
87	Simulate a simplified Netflix system: design entities like User, Content, and Watch History using JPA relationships, and expose REST APIs for user registration and content tracking	CO5
88	Case Study: Build A Netflix-like system to manage users, content, and viewing behavior using JPA.	CO5

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

CO1	Apply JDBC to integrate Java applications with relational databases for dynamic data handling and managing server-side programming using Servlets for handling web requests and responses.	K3
CO2	Analyze the use of JSP scripting elements, expression language, and directives to determine their effectiveness in dynamic web page rendering and maintainability.	K4
CO3	Implement modular, maintainable Java applications using advanced dependency injection techniques within the Spring Ecosystem.	K3
CO4	Design modular, loosely coupled web applications by implementing the MVC architecture using Spring MVC and Spring Boot.	K6
CO5	Deploy JPA to map, store, retrieve, and update data from java objects to relational databases and vice versa with RESTful APIs to enable scalable and maintainable services.	K6

Text Books:

4. Head First Servlets and JSP, O'Reilly Media, 2nd Edition (2008).
5. Java Server Pages, O'Reilly Media, 3rd Edition (2003)
6. Spring in Action, Manning, 6th Edition (2022).

Reference Books:

7. Core Servlets and JavaServer Pages, Volume 1: Core Technologies, Prentice Hall, 2nd Edition (2003).
8. Core Servlets and JavaServer Pages, Volume 2: Advanced Technologies, Prentice Hall, 2nd Edition (2004).
9. Pro Spring 6, Apress, 1st Edition (2023)
10. Pro JPA 2 in Java EE 8, Apress, 3rd Edition (2018).

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/playlist?list=PLlhM4lkb2sEjVsbbZ_kiixY5CcR84IQUg

https://www.youtube.com/playlist?list=PLXjHn7CHrmQhMkVC6KCfmsPHdklvUlQr

https://www.youtube.com/playlist?list=PL9ooVrP1hQOEfi91PCFQMawtBJrPpir7y

https://www.youtube.com/playlist?list=PL-XjHn7CHrmQhMkVC6KCfmsPHdklvUlQr

https://www.youtube.com/playlist?list=PLGRDMO4rOGcNSBOJOlrgQqGpIgo6_VZgR

B.TECH FOURTH YEAR	
Subject Code: BCSE0652	**L T P** **0 0 2**
Subject Name: Computer Networks Lab	**Credits** **1**
Course Objective: The objective of this course is to provide students with practical exposure to the fundamental concepts of computer networks. Through hands-on experiments, students will learn the construction and testing of physical media, implementation of networking protocols, network configuration, and basic network security techniques. The course aims to develop technical skills in network setup, IP addressing, protocol analysis, and network simulation using industry tools like Cisco Packet Tracer.	

Course outcome: After completion of this practical, student will be able to:

CO1	Build an understanding of UTP cable with RJ-45 connector, and build and test simple network using UTP cable.	K2, K4, K6
CO2	Understand and implementation of the bit stuffing protocol.	K2, K3
CO3	Understand and test the various network connection commands of TCP/IP and error control, flow control.	K2, K4
CO4	Understand and implementation of the concept of IP addressing and security technique likes Caesar cipher and RSA.	K2, K3
CO5	Design and understanding the various topology and configuration of switch and router using cisco packet tracer	K2, K6

List of Practical

Lab No.	Program Logic Building	CO Mapping
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

B.TECH THIRD YEAR		
Subject Code: BCSDS0651		**L T P** 0-0-6
Subject Name: DATA ANALYTICS		**Credits** 3
Pre- requisites: Basic Knowledge of Statistics and Probability.		
Course Contents/Syllabus		
Unit-1	**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.	8 hours
Unit-2	**Data Handling:** 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.	8 hours
Unit-3	**Data Pre-processing:** 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.	8 hours
Unit-4	**Exploratory Data Analysis:** 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.	8 hours
Unit-5	**Data Visualization:** 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	8 hours

	panels, customizing filters, Using and Customizing tooltips, Formatting your data with colours, Creating Dashboards & Stories, Distributing & Publishing Your Visualization	

List of Practical		
Sr. No.	**Program Title**	**CO Mapping**
1	• Installation of MySQL, Anaconda, and Tableau • To perform data import/export (.CSV, .XLS, .TXT) operations using data frames in R/Python • To perform data pre-processing operations i) Handling Missing data ii) Min-Max normalization • To perform dimensionality reduction operation using PCA Houses Data Set • To perform statistical operations (Mean, Median, Mode and Standard deviation) using	CO1
2	**Tableau – getting started** • User interface • Methodology for working with the interface • Connecting to different types of data sources (Excel, csv, Access, MySQL, Tableau Server) • Editing Data Connections and Data Sources; Live mode vs. Extract mode • Date interpreter / Pivot **Joining multiple datasets** • Union / Join • Cross database joins Data Blending – integrating different data source	CO2
3	**Basic functionalities** • Filtering • Sorting • Grouping • Hierarchies • Creating sets • Pivot tables Types of dates – Continuous vs. Discreet • **Calculations** • Syntax • Table calculations • LOD expressions • Aggregate Date, Logic, String, Number, Type calculations **Built-in chart types/visualisations:** • Line chart	CO3

	• Dot chart • Bar chart • Other types of visualisation (bullet graph, Heat map, Tree map, etc.). Combo charts – dual axis	
4	**Custom chart types:** • KPI matrix • Waterfall • Gantt • Dot plot • Pareto Analytics' options: trend lines, forecasting, clustering	CO4
5	**CREATE AND FORMAT REPORTS USING THE TABLEAU DESKTOP** • Describe the use of Page Backgrounds and Templates • Create visualizations to display the data • Apply drill through and drill down • Create and manage slicers with the use of filters • Explore visual interactions • Review Bookmarks • Publish the report to the Tableau online **Dashboards and stories** • Building dashboards • Dashboard objects • Dashboard formatting Dashboard extensions Story points	CO5

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

CO1	Understand the fundamental concepts of data analytics in the areas that plays major role within the realm of data science.	K1
CO2	Explain and exemplify the most common forms of data and its representations.	K2
CO3	Understand and apply data pre-processing techniques.	K3
CO4	Analyse data using exploratory data analysis.	K4
CO5	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: NPTEL/You Tube/Web Link
https://www.youtube.com/playlist?list=PL15FRvx6P0OWTlNBS_93NHG2hIn9cynVT
https://www.youtube.com/playlist?list=PLLy_2iUCG87DxxkLX4Pc3wCvsF1yAvz0T
https://www.youtube.com/watch?v=lhO3fBiMDag
https://www.youtube.com/watch?v=q4pyaVZjqk0
https://www.youtube.com/playlist?list=PLWPirh4EWFpGXTBu8ldLZGJCUeTMBpJFK

B. TECH THIRD YEAR (ELECTIVE-III)		
Subject Code: BCSML0611		**L T P** 3-0-0
Subject Name: DEEP LEARNING		**Credits** 3
Pre- requisites: Python, Basic Modeling Concepts.		
Course Contents/Syllabus		
Unit-1	**Model Improvement and Performance:** Curse of Dimensionality, Bias and Variance Trade off, Overfitting and underfitting, Regression - MAE, MSE, RMSE, R Squared, Adjusted R Squared, p-Value, Classification - Precision, Recall, F1, Other topics, K-Fold Cross validation, RoC curve, Hyper-Parameter Tuning Introduction – Grid search, random search, Introduction to Deep Learning. **Artificial Neural Network:** Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: Single layer and Multilayer feed forward networks, recurrent networks. Various learning techniques; Perception and Convergence rule, Hebb Learning. Perceptron's, Multilayer perceptron, Gradient descent and the Delta rule, Multilayer networks, Derivation of Backpropagation Algorithm.	8 hours
Unit-2	**Convolution Neural Network:** What is computer vision? Why Convolutions (CNN)? Introduction to CNN, Train a simple convolutional neural net, Explore the design space for convolutional nets, Pooling layer motivation in CNN, Design a convolutional layered application, Understanding and visualizing a CNN, Transfer learning and fine-tuning CNN, Image classification, Text classification, Image classification and hyper-parameter tuning, Emerging NN architectures.	8 hours
Unit-3	**Detection & Recognition:** Padding & Edge Detection, Strided Convolutions, Networks in Networks and 1x1Convolutions, Inception Network Motivation, Object Detection, YOLO Algorithm.	8 hours
Unit-4	**Recurrent Neural Networks:** Why use sequence models? Recurrent Neural Network Model, Notation, Back-propagation through time (BTT), Different types of RNNs, Language model and sequence generation, Sampling novel sequences, Vanishing gradients with RNNs, Gated Recurrent Unit (GRU), Long Short-Term Memory (LSTM), Bidirectional RNN, Deep RNNs	8 hours
Unit-5	Auto Encoders in Deep Learning: Auto-encoders and unsupervised learning, Stacked auto-encoders and semi-supervised learning, Regularization - Dropout and Batch normalization.	8 hours

Course Outcomes – After completion of this course students will be able to:		
CO 1	Analyze ANN model and understand the ways of accuracy measurement.	K4

CO 2	Develop a convolutional neural network for multi-class classification in images	K6
CO 3	Apply Deep Learning algorithm to detect and recognize an object.	K3
CO 4	Apply RNNs to Time Series Forecasting, NLP, Text and Image Classification;	K4
CO 5	Apply Lower-dimensional representation over higher-dimensional data for dimensionality reduction and capture the important features of an object.	K3

Text Books:

1. Zurada and Jacek M, "Introduction to Artificial Neural Systems", West Publishing Company, 1992, ISBN: 9780534954604
2. Bishop, C. M. Neural Networks for Pattern Recognition. Oxford University Press. 1995.
3. Simon Haykin, "Neural Networks and Learning Machines" Third Edition
4. Deep Learning", I Goodfellow, Y Bengio and A Courville, 1st Edition 2016
5. Introduction to Machine Learning with Python ", by Andreas C. Müller, Sarah Guido
6. R2. Deep Learning with Python by François Chollet 1st Edition

Reference Books:

1. Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola "Dive into Deep Learning", Release 0.17.4
2. Artificial Intelligence: A Modern Approach. Prentice Hall Series in Arti□Russell, S. and Norvig, N. Arti Intelligence. 2003.

Links: NPTEL/You Tube/Web Link

(4) noc19-cs33 Lecture 1-Introduction to Big Data - YouTube

(4) Lecture 26: Map-reduce and Hadoop - YouTube(3) Lecture 2 | Image Classification - YouTube

(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

(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

(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-IV)		
Subject Code: BCSAI0619		**L T P** 3-0-0
Subject Name: BUSINESS INTELLIGENCE AND DATA VISUALIZATION		**Credits** 3
Pre- requisites: Basic Knowledge of Business intelligence.		
Course Contents/Syllabus		
Unit-1	**Introduction To Business Intelligence:** 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.	8 hours
Unit-2	**Elements Of Business Intelligence Solution**s: 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.	8 hours
Unit-3	**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	8 hours
Unit-4	**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	8 hours

	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-5	**Introduction to power BI :**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.	8 hours

Course Outcomes – 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	K3
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.	K6
CO 5	Learn basics of structuring data and creating dashboard stories adding interactivity dashboard stories.	K6

Text Books:

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.

Links: NPTEL/You Tube/Web Link

Introduction to Business Intelligence - YouTube

Business Intelligence Tutorial - YouTube
What Is Power BI? | Introduction To Microsoft Power BI | Power BI Training | Edureka - YouTube
https://www.tableau.com/academic/students
Top 10 Data Visualization Tools in 2020 | Best Tools for Data Visualization | Edureka - YouTube Learn Data Visualization Using Tableau | Tableau Tutorial | Tableau | Edureka Live - YouTube

B. TECH THIRD YEAR (ELECTIVE-III)		
Subject Code: BCSAI0611		**L T P** 3-0-0
Subject Name: CLOUD STORAGE MANAGEMENT		**Credits** 3
Pre- requisites: Adequate knowledge of Basics of Cloud Computing and its architecture covered through courses prior to this semester.		
Course Contents/Syllabus		
Unit-1	**INTRODUCTION:** 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.	8 hours
Unit-2	**CLOUD INFRASTRUCTURE AND STORAGE:** 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.	8 hours
Unit-3	**CLOUD STORAGE SOLUTIONS**: 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.	8 hours
Unit-4	**CLOUD INFRASTRUCTURE AND MIGRATION SOLUTIONS:** 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).	8 hours
Unit-5	**MIGRATION CASE STUDY** 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.	8 hours

Course Outcomes – 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
CO 4	Understand cloud migration solutions	K4
CO 5	Analyze cloud migration solutions on different needs	K5

Text Books:

1. AWS Docs.

Links: NPTEL/You Tube/Web Link

s07/slides/cse497b-lecture-26-virtualmachine.pdf

https://docs.aws.amazon.com/Security

https://aws.amazon.com/what-is-cloud-storage/
https://docs.aws.amazon.com/S3

www.ibm.com/in-en/cloud/learn/iaas-paas-saas

https://aws.amazon.com/cloud-migration/
https://docs.aws.amazon.com/migrationhub/?id=docs_gateway

B. TECH THIRD YEAR (ELECTIVE-IV)		
Subject Code: BCSAI0621		**L T P** 3-0-0
Subject Name: BIG DATA		**Credits** 3
Pre- requisites:		
Course Contents/Syllabus		
Unit-1	**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.	8 hours
Unit-2	**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	8 hours
Unit-3	**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.	8 hours
Unit-4	**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.	8 hours

Unit-5	**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.	8 hours

Course Outcomes – 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

Viktor Mayer-Schonberger, ennethCukier, Big Data: A Revolution that will transform how we live,work and
3. think.

Links: NPTEL/You Tube/Web Link

Introduction to Business Intelligence - YouTube

Business Intelligence Tutorial - YouTube

What Is Power BI? | Introduction To Microsoft Power BI | Power BI Training | Edureka - YouTube

https://www.tableau.com/academic/students

Top 10 Data Visualization Tools in 2020 | Best Tools for Data Visualization | Edureka - YouTube Learn Data Visualization Using Tableau | Tableau Tutorial | Tableau | Edureka Live - YouTube

B. TECH THIRD YEAR (ELECTIVE-III)		
Subject Code: BCSE0611		**L T P** 3-0-0
Subject Name: CRM DEVELOPMENT		**Credits** 3
Pre- requisites: Creative thinking and which is being used by the creative talent in your business areas		
Course Contents/Syllabus		
Unit-1	**Salesforce Fundamentals :**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.	8 hours
Unit-2	**Salesforce Data Modeling :**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	8 hours
Unit-3	**Logic and Process Automation:**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.	8 hours
Unit-4	**User Interface :**General development, Apex code development Visualforce development , Sales dashboard , Visualforce performance ,Technique for optimizing performance Lightning Web Components Basics Lightning App Builders Development.	8 hours
Unit-5	**Testing, Debugging, and Deployment :**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.	8 hours

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

CO 1	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)

Links: NPTEL/You Tube/Web Link

www. Trailhead.salesforce.com

www.mindmajix.com/salesforce-tutorial

www,youtube.com/watch?v=7K42geizQCI

B. TECH THIRD YEAR (ELECTIVE-IV)		
Subject Code: BCSE0613		**L T P** 3-0-0
Subject Name: ROBOTICS PROCESS AUTOMATION(RPA)		**Credits** 3
Pre- requisites: Computer Organization and Architecture		
Course Contents/Syllabus		
Unit-1	**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.	8 hours
Unit-2	**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	8 hours
Unit-3	**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	8 hours
Unit-4	**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	8 hours

	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-5	**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	8 hours

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

CO 1	Understand RPA principles, its features and applications	K3
CO2	Demonstrate proficiency in handling several types of variables inside a workflow and data manipulation techniques	K3
CO3	Gain insights into Desktop, Web, Citrix, Email Automation and exception handling.	K2
CO4	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."

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=3SMZHd_ngIw

https://www.youtube.com/watch?v=3zXb8H3odek

https://www.youtube.com/watch?v=3zXb8H3odek
https://www.youtube.com/watch?v=3zXb8H3odek

B. TECH THIRD YEAR (ELECTIVE-III)		
Subject Code: BCSE0614		**L T P** 3-0-0
Subject Name: WEB DEVELOPMENT USING MEAN STACK		**Credits** 3
Pre- requisites: Basic knowledge of HTML, CSS and ES6 required.		
Course Contents/Syllabus		
Unit-1	**Introduction to Nodejs :**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).	8 hours
Unit-2	**Express Framework:** 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.	8 hours
Unit-3	**Basics of Angular js :** 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.	8 hours
Unit-4	**Building Single Page App with Angular js:** 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.	8 hours
Unit-5	**Connecting Angular js with MongoDB :** 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.	8 hours

Course Outcomes – 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
CO2	Demonstrate web application framework i.e., Express is to design and implement typical dynamic web pages and interactive web based applications.	K3, K6

CO3	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
CO4	Analyze, build and develop single page application using client-side programming i.e. angular js and also develop a static web application.	K3, K4
CO5	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 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.

Links: NPTEL/You Tube/Web Link

https://youtu.be/BLl32FvcdVM

https://youtu.be/fCACk9ziarQ

https://youtu.be/YSyFSnisip0

https://youtu.be/mGVFltBxLKU

https://youtu.be/bWaucYA1YRI

https://youtu.be/7H_QH9nipNs

https://youtu.be/AX1AP83CuK4

https://youtu.be/SccSCuHhOw0

https://youtu.be/lY6icfhap2o

https://youtu.be/z7ikpQCWbtQ
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
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
https://youtu.be/Kvb0cHWFkdc https://youtu.be/pQcV5CMara8 https://youtu.be/c3Hz1qUUIyQ https://youtu.be/Mfp94RjugWQ https://youtu.be/SyEQLbbSTWg

B. TECH THIRD YEAR (ELECTIVE-IV)		
Subject Code: BCSE0612		**L T P** 3-0-0
Subject Name: Full-Stack Web Development using Laravel with Vue.js		**Credits** 3
Pre- requisites: Basic knowledge of HTML, CSS, JavaScript & PHP required.		
Course Contents/Syllabus		
Unit-1	**Introduction to Laravel:** Laravel Features, Laravel installation, Application Structure of Laravel,Root Directory, App Directory, Basic Configuration, Environmental Configuration, Routing, Routing Parameters,Middleware,Terminable Middleware, Middleware Parameter, Controllers, Restful Resource Controllers, Implicit Controllers, Constructor Injection, Method Injection, Laravel Sail, Laravel Jetstream.	8 hours
Unit-2	**Veu.js Framework & Inertia.js**: Vue.js Template Syntax And Expressions,Vue directives, loops and conditional rendering,VueDevtools,Handling user Inputs, Handling Events,Vuejs Methods and Computed Properties, Attribute Bindings and dynamic classes, Concepts of Inertia.js, How it works,Inertia protocol, Routing, Responses and Pages, Creating links, GET, POST, PUT, PATCH, and DELETE method in Inertia.js .	8 hours
Unit-3	**Laravel Authentication & Laravel Faker:** Laravel design patter, Laravel blade template engine,Artisan command,Login with username or email, Register with username or email, Logout,Validate request data (required, unique, etc..), Protecting Router,PasswordConfirmation,Social & Other Authentication method, Show success / Failure message, Faker PHP library, Create data seeder,Seed data, Localisation, Model Factories.	8 hours
Unit-4	**Connecting Laravel with databses:** Database Configuration File, Read/Write connections, Running A Select Query, Running an Insert, Update, Delete Statement, Listening For Query Events, Database Transaction, rollback and commit method, Accessing connections, Query Logging, Laravel Query Builder & ORM,Laravel Migration& Eloquent.	8 hours
Unit-5	**Deployment Laravel application to production:** PHP Extension: BCMath,Ctype,cURL,JSON,Mbstring,OpenSSL,PCRE,PDOServer Configuration, Nginx ,Laravel server management service LaravelForge,Autoloader optimization, Optimizing Configuration Loading, Optimizing Route Loading, Optimizing View Loading,Debug Mode,Deploying With Vapor.	8 hours

Course Outcomes – After completion of this course students will be able to:		
CO 1	Apply the knowledge of PHP that are vital in understanding Laravel application and analyze the concepts, principles and methods in current Server-side technology to implement Laravel application over the web.	K3, K6
CO2	Explain, analyze and apply the role of Client-side scripting language like Vuejs in the workings of the web and web applications.	K2, K3

CO3	Implementing and analyzing the concept of Larvel Faker and Authentication on Laravel.	K3, K6
CO4	Understand the impact of web designing by database connectivity with different databases in the current market place where everyone use to prefer electronic medium for shoping, commerce, and even social life also.	K2, K3
CO5	Analysing and Creating a functional website using Laravel and Vuejs and Deploying and Optimizing Web Application using Forge / Vapor.	K3, K4

Text Books:

1. Rufus Stewart, mEmlnc, "Laravel: The Ultimate Beginner's Guide to Learn Laravel Step by Step", 2nd Edition 2020, BPB Publications.
2. Anthony Gore, "Full-Stack Vue.js 2 and Laravel 5", 3rd Edition 2017, Packet Publication.
3. Stewart Rufus, "Laravel (French, Paperback, Stewart Rufus)", 2ndEdition, 2018 BPB Publications.
4. Matt Stauffer, "Laravel: Up & Running: A Framework for Building Modern PHP Apps", 2nd Edition, 2019, O'Reilly Media Publications.
5. Callum Macrae,"Vue.js – Up and Running: Building Accessible and Performant Web Apps",1stEdition, 2019, O'Reilly Media Publications.

Reference Books:

1. Anthony Accomazzo, Ari Lerner, and Nate Murray, "Fullstack Laravel: The Complete Guide to Laravel and Friends", 4th edition, 2020 International Publish in
2. David Cho, "Full-Stack Laravel, Type Script, and Vuejs: Build cloud-ready web applications using Laravel with Hooks and GraphQL", 2nd edition, 2017 Packt Publishing Limited.
3. Sanjib Sinha, "Beginning Laravel: Build Websites with Laravel 5.8"2nd edition, 2019, Apress publication.
4. Glenn Geenen, Sandro Pasquali, Kevin Faaborg, "Mastering Vue.js: Build robust and scalable real-time server- side web applications efficiently" 2nd edition, 2016,Packt Publishing Limited.
5. Greg Lim,"Beginning Node.js, Express & MongoDB Development ,kindle edition,2015, international publishing.
6. Daniel Perkins, "Laravel and Vuejs Master Angular.js with simple steps, guide and instructions" 3rd edition, 2015 SMV publication.
7. Peter Membrey, David Hows, EelcoPlugge, "MongoDB Basics", 2nd edition ,2018 International Publication.

Links: NPTEL/You Tube/Web Link

https://youtu.be/ImtZ5yENzgE https://youtu.be/0urHFBFHsLc?list=PL8p2I9GklV46dciS4GDzBFHBi0JVIbnzT https://youtu.be/vjDLtAPXP34?list=PL7BQ4lqtgECS0oCt5jGaf0v77mBjS5r5O https://youtu.be/EU7PRmCpx-0?list=PLillGF-RfqbYhQsN5WMXy6VsDMKGadrJ- https://youtu.be/JNhmEoBsZ48

https://youtu.be/qZXt1Aom3Cs
https://youtu.be/FXpIoQ_rT_c
https://youtu.be/nhBVL41-_Cw
https://youtu.be/bzlFvd0b65c
https://youtu.be/e-E0UB-YDRk

https://youtu.be/Od1RSXGLnEI
https://youtu.be/XCrmk1bKxf4
https://youtu.be/ORus3-By4lk

https://youtu.be/UWniysfpTmM https://youtu.be/ko4PU4eplnY
https://youtu.be/UN3de_GEJiI https://youtu.be/qCMgxDfRKCo https://youtu.be/XP1DntIzyyI https://youtu.be/Zf6o7ag5WPI https://youtu.be/XoULf9nFclk
https://youtu.be/dB1mazCqQAU https://youtu.be/w1JNkv-GH3A https://youtu.be/G5Nk4VykcUw https://youtu.be/X4KElZcUi-g