NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA, G.B. NAGAR (AN AUTONOMOUS INSTITUTE)



Affiliated to

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



Evaluation Scheme & Syllabus

For

B.Tech in Information Technology (IT) Fourth Year

(Effective from the Session: 2025-26)

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

Bachelor of Technology Information Technology EVALUATION SCHEME

SEMESTER -VII

S. N	Subject	Subject Name	Type of	Pe	eriod	s	Evaluation Schemes		End Semester		Total	Credit		
0.	Codes	J	Subject	L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	ACSE0701	Computer Vision	Mandatory	3	0	0	30	20	50		100		150	3
2		Departmental Elective-V	Departmental Elective	3	0	0	30	20	50		100		150	3
3		Open Elective-II	Open Elective	3	0	0	30	20	50		100		150	3
4		Open Elective-III	Open Elective	3	0	0	30	20	50		100		150	3
5	ACSE0751	Computer Vision Lab	Mandatory	0	0	2				25		25	50	1
6	ACSE0759	Internship Assessment-III	Mandatory	0	0	2				50			50	1
		*Massive Open Online Courses	*MOOCs											
		(For B.Tech. Hons. Degree)	· MOOCS											
		TOTAL											700	14

* List of Recommended MOOCs (Massive Open Online Courses) for Forth Year B. Tech Students (Semester-VII)

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0312	Continuous Integration and Delivery - DevOps	Infosys Wingspan (Infosys Springboard)	46h 41m	3.5
2	AMC0227	Deep Learning for Developers	Infosys Wingspan (Infosys Springboard)	34h 51m	2.5
3	AMC0279	Spring Boot and Angular-React Stack -DevOps Tools and Capstone Project	Infosys Wingspan (Infosys Springboard)	107h 50m	4

PLEASE NOTE:-

• Internship (3-4 weeks) shall be conducted during summer break after semester-VI and will be assessed during Semester-VII

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam, CE: Core Elective, OE: Open Elective, DE: Departmental Elective, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

	List of Departmental Electives									
Subject Codes	Subject Name	Type of Subject	Bucket Name	Branch	Semester					
ACSE0712	RPA Implementation	Departmental Elective-V	CRM-RPA	IT	7					
ACSAI0712	Natural Language Processing	Departmental Elective-V	AI/ML	IT	7					
ACSE0713	Web Development using MERN Stack with DevOps	Departmental Elective-V	Full Stack Development	IT	7					
ACSAI0713	Programming for Data Analytics	Departmental Elective-V	Cloud Computing	IT	7					

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

Bachelor of Technology Information Technology EVALUATION SCHEME SEMESTER -VIII

S.	Subject	Cubicat Nama	Type of	P	erio	ds	F	Evalu	ation Sche	mes		nd ester	Total	Credit
No.	Codes	Subject Name	Subject	L	T	P	СТ	TA	TOTAL	PS	TE	PE	Total	Credit
1		Open Elective-IV	Open Elective	2	0	0	30	20	50		100		150	2
2	ACSE0859/ ACSE0858	Capstone Project/Industrial Internship	Mandatory	0	0	20				200		300	500	10
		*Massive Open Online Courses (For B.Tech. Hons. Degree)	*MOOCs											
		TOTAL											650	12

* List of Recommended MOOCs (Massive Open Online Courses) for Forth Year B. Tech Students (Semester-VII)

S.No.	No. Subject Code Course Name		University/Industry Partner Name	No. of Hours	Credit
1	AMC0300	Fundamentals of Routing	Infosys Wingspan (Infosys Springboard)	83h 30m	4
2	AMC0301	Mobile App Development using Flutter	Infosys Wingspan (Infosys Springboard)	44h 37m	3.5

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam, CE: Core Elective, OE: Open Elective, DE: Departmental Elective, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

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

Bachelor of Technology Information Technology

AICTE Guidelines in Model Curriculum:

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

1.	For 6 to 12 Hours	=0.5 Credit
2.	For 13 to 18	=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 FOURTH YEAR	
Subject Code: ACSE0701	LTP 300
Subject Name: Computer Vision	Credits 3

Course Objective: To learn about key features of Computer Vision, design, implement and provide continuous improvement in the accuracy and outcomes of various datasets with more reliable and concise analysis results.

Pre- requisites: Basic Knowledge of programming language Python/ Advanced Python features/

Librarie		
	Course Contents/Syllabus	
Unit -1	Introduction to Computer Vision Computer Vision, Research and Applications, (Self-Driving Cars, Facial Recognition, Augmented & Mixed Reality, Healthcare). Most popular examples Categorization of Images, Object Detection, Observation of Moving Objects, Retrieval of Images Based on Their Contents, Computer Vision Tasks classification, object detection, Instance segmentation. Convolutional Neural Networks, Evolution of CNN Architectures for Image, Recent CNN	8 Hours
Unit -2	Architectures Representation of a Three-Dimensional Moving Scene. Convolutional layers, pooling layers, and padding. Transfer learning and pre-trained models Architectures. Architectures Design: LeNet-5, AlexNet, VGGNet, GoogLeNet, ResNet, Efficient Net, Mobile Net, RNN Introduction.	8 Hours
Unit -3	Segmentation Popular Image Segmentation Architectures, FCN Architecture, Upsampling Methods, Pixel Transformations, Geometric Operations, Spatial Operations in Image Processing, Instance Segmentation, Localisation, Object detection and image segmentation using CNNs, LSTM and GRU's. Vision Models, Vision Languages, Quality Analysis, Visual Dialogue, Active Contours & Application, Split & Merge, Mean Shift & Mode Finding, Normalized Cuts.	8 Hours
Unit -4	Object Detection Object Detection and Sliding Windows, R-CNN, Fast R-CNN, Object Recognition, 3-D vision and Geometry, Digital Watermarking. Object Detection, face recognition instance Recognition, Category Recognition Objects, Scenes, Activities, Object classification.	8 Hours
Unit -5	Visualization and Generative Models Benefits of Interpretability, Fashion MNIST, Class Activation, Map code walkthrough, GradCAM,ZFNet. Introduction about Deep Generative Models, Generative Adversarial Networks Combination VAE and GAN's, other VAE and GAN's deep generative models. GAN Improvements, Deep Generative Models across multiple domains,Deep Generative Models image and video applications.	8 Hours

Course Outcomes -

CO1	Analyse knowledge of deep architectures used for solving various Vision and Pattern Association tasks.	K4
CO2	Develop appropriate learning rules for each of the architectures of perceptron and learn about different factors of back propagation.	K3
CO3	Deploy training algorithm for pattern association with the help of memory network.	K5
CO4	Design and deploy the models of deep learning with the help of use cases.	K5
CO5	Understand, Analyse different theories of deep learning using neural networks.	K 4

Text Books:

- 1. "Introductory Techniques for 3D Computer Vision", edition 2009
- 2. Szelisk Richard, "Computer Vision: Algorithms and Applications", 2022, The University of Washington Edition, 2022
- 3. Forsyth D. and Ponce J., "Computer Vision A Modern Approach", Prentice Hall,, Edition 2015
- 4. Trucco E. and Verri A., "Introductory Techniques for 3D Computer Vision", Prentice Hall.
- 5. Davies E. R., "Computer & Machine Vision", Academic Press 4th Edition 2012
- 6. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press Edition, 2012

Reference Books:

- 1. Forsyth D. and Ponce J., "Computer Vision: A Modern Approach", Prentice Hall, 2nd edition, 2015
- 2. "Prince, Simon J.D. "Computer Vision: Models, Learning, And Inference". Cambridge University Press, 1st Edition, 2012.
- 3. Ballard D. H., Brown C. M., "Computer Vision", Prentice-Hall, 2008.
- Craig Alan B., "Understanding Augmented Reality, Concepts and Applications", Morgan Kaufmann, Edition 2013
- 5. Richard Szeliski, "Computer Vision: Algorithms and Applications (CVAA)", Springer edition, 2022

Links: NPTEL/You Tube/Web Link

https://nptel.ac.in/courses/106/105/106105216/

https://onlinecourses.nptel.ac.in/noc23_ee78/preview/

https://nptel.ac.in/courses/106/106/106106224/

https://nptel.ac.in/courses/108103174/

https://nptel.ac.in/courses/106/106/106106224/ 2023

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

	B.TECH FOURTH YEAR	
Subje	ect Code:ACSE0751	L T P 0 0 2
Subje	ect Name: Computer Vision Lab	Credits
unders variou	se Objective: Through practical programming exercises, students will deepen the tanding CNN, Segmentation, Image Compression based models. They will be expos practical considerations, using autoencoders. Study of various advanced topics who for making deep learning systems perform well in practice.	sed to
Cour	se outcome: After completion of this practical, students will be able to:	
COI	Implement a various convolutional neural network and understand its architecture.	К3
CO 2	Apply image Modelling acquisition, Segmentation and develop a programming model to implement an Image morphological features.	К3
CO 3	Understand Visualization of various models and Deep GAN Networks.	K2
Li	st of Practical	
Lab No.	Program Logic Building	CO Mapping
1	Building a simple convolutional neural network for spam classification.	CO1
2	Building a simple convolutional neural network for image classification.	CO1
3	Implementing different types of pooling layers and comparing their effects on network performance.	CO2
4	Training a CNN model on a large-scale image classification dataset using cloud-based GPU acceleration.	CO1
5	Building a simple convolutional neural network for Cats-v-dogs classification	CO1
6	Fine-tuning a pre-trained CNN for a specific image recognition task.	CO1
7	Building a simple convolutional neural network for transfer learning using finetuning.	CO1
8	Building a simple convolutional neural network for transfer learning using feature extraction.	CO1
9	Building a CNN model for object detection using a pre-trained architecture like YOLO.	CO1
10	Exploring different activation functions and comparing their effects on network performance.	CO1
11	Write a program to Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.	CO1
12	Implement a program for basic image operations.	CO2
13	Implement a program for image enhancement	CO2
14	Implement a program for image compression	CO2

		G 0.4
15	Implement a program for color image processing	CO2
16	Implement a program for image segmentation	CO2
17	Design a program for image morphology	CO2
18	Implementing De-noising auto encoder.	CO2
19	Implementing Deep auto encoder.	CO2
20	Implementing convolutional auto encoder.	CO2
21	Implementing feature extraction for classification using auto encoder.	CO3
22	Implementing feature extraction for regression using auto encoder.	CO3
27	Perform scaling, rotation and shifting operations on an image using OpenCV()	CO3
28	Perform image reflection on an image using OpenCV().	CO3
23	Implementing a basic Variational Autoencoder (VAE) for image generation	CO3
24	Training a Generative Adversarial Network (GAN) to generate synthetic images.	CO3
25	Implement and apply using Image Restoration	CO3
26	Implement and apply using Edge detection	CO3
29	Perform Image shearing on an image using OpenCV().	CO3
30	Write a function for all the geometric transformations and apply it to any image	CO3
Links	3:	
_	nptel.ac.in/courses/106/105/106105216/ 2023	
	onlinecourses.nptel.ac.in/noc23_ee78/preview/	
	nptel.ac.in/courses/106/106/106106224/ nptel.ac.in/courses/108103174/	
	nptel.ac.in/courses/106/106/106106224/ 2023	
_	onlinecourses.nptel.ac.in/	
10000011		

Subject Code: ACSE0712	
Subject Code: ACSE0712	
Subject Name: RPA Implementation Credital 3	ts
Course Objective: This course is designed to give a thorough understanding and practical sk developing and deploying software robots for Robotic Process Automation (RPA).	ills in
Pre- requisites: Basic Knowledge of C Programming	
Course Contents/Syllabus	
Unit-1 Data Manipulation: Introduction to Data Manipulation, Scalar variables, collection and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data Recording and Advanced UI Interaction; Recording Introduction, Basic and Deskto Recording, Web Recording, Input/output Methods, Screen Scraping, Data Scraping Scraping advanced techniques	8 Hours
Selectors: Selectors, Defining and Assessing Selectors, Customization, Debuggin Dynamic Selectors, Partial Selectors, RPA Challenge, Image, Text & Advanced Citr Automation, Introduction to Image & Text Automation, Image-based automatic Keyboard based automation, Information Retrieval, Advanced Citrix Automatic challenges, Best Practices using tab for Images Starting Apps	ix 8 Hours
Data Tables and Automation: Excel Data Tables & PDF, Data Tables in RPA, Excel and Data Table Basics Data Manipulation in Excel, Extracting Data from PD extracting a single piece of data, Anchors, Using anchors in PDF Email Automation: Email Automation, Incoming Email automation, Sending Email automation	F, 8 Hours
Unit-4 Debugging and Exception Handling: Debugging Tools, Strategies for solving issues, Catching errors. Orchestrator: Tenants, Authentication, Users, Roles, Robots, Environments, Queu & Transactions, Schedules	8 Hours
Unit-5 Robotic Framework: Re-Framework template, Re-Framework template works, Use Re-Framework to automate your own processesNET Classes and Objects	8 Hours
Course Outcomes:	
CO1 Apply the concepts and methods for data manipulation.	K3
CO2 Learn basic implementation of Selectors.	K2
CO3 Implement the knowledge of RPA tools, and functions in various industries Gain expertise in Desktop, Web & Citrix Automation and use RE-Framework to build a structured business automation process.	K4 K2
CO5 Develop a real-world workflow automation project and will be able to debug a workflow.	K5
Textbooks:	
1. Jain Vaibhav, "Crisper Learning: For UiPath", Latest Edition, Independently Published, 20	18.
2. Tripathi Alok Mani, "Learning Robotics Process Automation", Latest Edition, Packt Publi Birmingham. March 2018	shing ltd,
Reference Books/E-Books:	

- 1. Wibbenmeyer Kelly, "The Simple Implementation Guide to Robotic Process Automation (RPA)", Latest Edition, iUniverse Press, 2018.
- 2. https://www.uipath.com/hubfs/ebook-its-time-to-automate.pdf

Links: NPTEL/You Tube/Web Link

https://www.youtube.com/watch?v=6QoCG6YIPVo&list=PL41Y-9S9wmyJarNN2KnB4XudpT1yE1kVd

https://www.youtube.com/watch?v=YOHFgrOvPTM&list=PL41Y-

9S9wmyLvF6Ou0oPhg6MrFWSw7sn4,

https://www.youtube.com/watch?v=QMBuyLMjOhM&list=PL41Y-

9S9wmyIYX6kciM8DboVYymsv2y6K,

https://www.youtube.com/watch?v=KE9raKNTkfl&list=PL41Y-9S9wmyLeXL1DY9j-XepNb vg9N8t,

https://www.youtube.com/watch?v=2rjr8QhD9oc&list=PL41Y-9S9wmyJi2zmWY77yPZrdVI7ab3Ja,

	B. Tech Fourth YEAR VII Semester		
Subject Code: ACSAI0712 L T P 3 0 0 Subject Name: Natural Language Processing Credits 3			
	bjective: The course aims to provide an understanding of the foundation in NLP. The focus is on providing application-based knowledge.	nal concepts	and
Pre-requ Learning.	isites: Programming Skills, Data Structures, Algorithms, Probability a	nd Statistics	, Machine
	Course Contents / Syllabus		
Unit-1	Overview of Natural Language Processing Definition, Applications and emerging trends in NLP, Challenges. Amb NLP tasks using NLTK: Tokenization, stemming, lemmatization, stop-v removal, POS tagging, Parsing, Named Entity Recognition, coreference	vord	8 Hours
Unit-2	Regular Expressions Data Preprocessing: Convert to lower case, handle email-id, HTML temojis, repeat characters, normalization of data (contractions, standardize Vocabulary, corpora, and linguistic resources, Linguistic foundations: Normalization, semantics and pragmatics, Language models: Unigram, Bigram,	ze) etc. Iorphology,	8 Hours
Unit-3	Text Analysis and Similarity Text Vectorization: Bag-of-Words model and vector space models, Tern Term Frequency, TF-IDF Textual Similarity: Cosine similarity, Word Mover's distance, Word em Word2Vec, GloVe.	n Presence,	8 Hours
Unit-4	Text Classification & NLP Applications Text classification: Implement of applications of NLP using text classification: Implement of applications of NLP using text classification: Analysis, Topic modelling, Spam detection. High Level NLP applications: Machine translation: Rule-based and approaches, Text summarization Dialog systems, conversational chatbots.	d statistical	8 Hours
Unit-5	Advanced NLP Techniques Sequential data, Introduction to sequence models - RNN and LSTM, At Mechanism, Transformer, Transformer-based models: BERT, GPT, T5, Introduction to Hugging Face Transformers, Case studies.		8 Hours
Course ou	tcome: After completion of this course students will be able to:		
CO 1	Discuss the emerging trends and challenges in NLP and perform the basic using some NLP library.	c NLP tasks	K2
CO 2	Apply regular expressions for data cleaning and understand the f concepts and theories underlying NLP.	undamental	К3
CO 3	Extract features and find similarity in text data.		К3

CO4	Implement NLP techniques to design real-world NLP applications	К3
CO 5	Apply advanced techniques like sequential modelling and attention mechanism to develop NLP applications	K4

Textbooks:

- 1. Daniel Jurafsky, James H. Martin, "Speech and Language Processing", Second Edition, Pearson Education, 2009 ISBN 0131873210.
- 2. James Allen, Natural Language Understanding, 2nd edition, 1995 Pearson Education ISBN 13: 9780805303346.
- 3. Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, NLP: A Paninian Perspective,1st edition1995, Prentice ISSBN 9788120309210

Reference Books:

- 1. Christopher D. Manning and Hinrich Schutze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999 Second Edition, ISBN No. 0-262-13360-1.
- 2. T. Winograd, Language as a Cognitive Process, 1st edition, 1983 Addison- Wesley ISBN 020108-571-2
- 3. L.M. Ivansca, S. C. Shapiro, Natural Language Processing and Knowledge Representation, 2nd edition, 2000 AAAI Press ISBN-13: 978-0262590211

Links:

https://realpython.com/nltk-nlp-python/

https://www.coursera.org/lecture/python-text-mining/basic-nlp-tasks-with-nltk-KD8uN

https://www.coursera.org/lecture/nlp-sequence-models/learning-word-embeddings-APM5s

https://www.coursera.org/projects/regular-expressions-in-python

https://www.coursera.org/learn/python-text-mining/lecture/sVe8B/regular-expressions

Component life cycle, Hooks, react-router vs react-router-dom, Connecting React with mongodB: Google Material UI, AppBar, Material UI's Toolbar, NavBar, Material UI Buttons, SQL and Complex Transactions, Dynamic Schema, create Index (), get Indexes () & drop Index (), Replication, Statement-based vs. Binary Replication, Auto-Sharding and Integrated Caching, Load balancing, Aggregation, scalability. Node js & Express Framework: Introduction, Environment Setup, serving static resources, template engine with vash and jade, Connecting Node js to Database, Mongoose Module, Creating Rest APIs, Express Framework, MVC Pattern, Routing, Cookies and Sessions, HTTP Interaction, User Authentication Evolution of DevOps: DevOps Principles, DevOps Lifecycle, DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodology, Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, scrum testing, sprint Planning and Release management, Continuous Integration and Delivery pipeline. CI/CD concepts (GitHub, Jenkins, Sonar): GitHub, Introduction to Git, Version control system, Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes. Course Outcomes — CO1 Apply the knowledge of ES6 that are vital to implement react application over the web. K3 Mongodb. CO3 Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework CO4 Identify the benefits of DevOps over other software development processes to Gain insights into the DevOps environment.		B.TECH FOURTHYEAR		
Subject Name: Web Development using MERN Stack with DevOps Course Objective: This course focuses on how to design and build static as well as dynamic web pages and interactive web applications. Students can understand how to put them together to create a MERN stack application. Pre- requisites: Student should have the knowledge of HTML, CSS and ES6 Course Contents/Syllabus Introduction to React JS: Overview of frameworks, NPM commands, React App, Project Directory Structure, React Component Basic, Understanding JSX, Props and State, Stateless and Stateful Components, Component life cycle, Hooks, react-router vs react-router-dom, Connecting React with mongodB: Google Material UI, AppBar, Material UI's Toolbar, NavBar, Material UI Buttons, SQL and Complex Transactions, Dynamic Schema, create Index (), get Indexes () & drop Index (), Replication, Statement-based vs. Binary Replication, Auto-Sharding and Integrated Caching, Load balancing, Aggregation, scalability. Node js & Express Framework: Introduction, Environment Sctup, serving static resources, template engine with vash and jade, Connecting Node, js to Database, Mongoose Module, Creating Rest APIs, Express Framework, MVC Pattern, Routing, Cookies and Sessions, HTTP Interaction, User Authentication Evolution of DevOps: DevOps Principles, DevOps Lifecycle, DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodology, Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, scrum testing, sprint Planning and Release management, Continuous Integration and Delivery pipeline. CICIO concepts (Girllub, Jenkins, Sonar): GitFlub, Introduction to Git, Version control system, Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes. Course Outcomes — COI Apply the knowledge of ES6 that are vital to implement react applic	Subject	Code. VCSEU/13		
### Interactive web applications. Students can understand how to put them together to create a MERN stack application. ### Pre- requisites: Student should have the knowledge of HTML, CSS and ES6 Course Contents/Syllabus	Subject	Name: Web Development using MERN Stack Cre	edits	
Unit-1 Unit-1 Unit-2 Unit-2 Unit-2 Unit-3 Unit-3 Unit-3 Unit-4 Unit-5 Unit-4 Unit-5 Unit-6 Unit-7 Unit-7 Unit-7 Unit-8 Unit-8 Unit-9 U	interactiv	re web applications. Students can understand how to put them together to create a	_	_
Unit-1 Introduction to React JS: Overview of frameworks, NPM commands, React App, Project Directory Structure, React Component Basic, Understanding JSX, Props and State, Stateless and Stateful Components, Component life cycle, Hooks, react-router vs react-router-dom, Connecting React with mongodB: Google Material UI, AppBar, Material UI's Toolbar, NavBar, Material UI Buttons, SQL and Complex Transactions, Dynamic Schema, create Index (), get Indexes () & drop Index (), Replication, Statement-based vs. Binary Replication, Auto-Sharding and Integrated Caching, Load balancing, Aggregation, scalability. Node js & Express Framework: Introduction, Environment Setup, serving static resources, template engine with vash and jade, Connecting Node js to Database, Mongoose Module, Creating Rest APIs, Express Framework, MVC Pattern, Routing, Cookies and Sessions, HTTP Interaction, User Authentication Evolution of DevOps: DevOps Principles, DevOps Lifecycle, DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodology, Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, scrum testing, sprint Planning and Release management, Continuous Integration and Delivery pipeline. CICIC concepts (GitHub, Jenkins, Sonar): GitHub, Introduction to Git, Version control system. Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes. Course Outcomes — CO1 Apply the knowledge of ES6 that are vital to implement react application over the web. Implement and understand the impact of web designing by database connectivity with Mongodb. CO3 Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework Identify the benefits of DevOps over other software development processes to Gain insights into the DevOps environment.	Pre- requ	uisites: Student should have the knowledge of HTML, CSS and ES6		
Unit-1 Overview of frameworks, NPM commands, React App, Project Directory Structure, React Component Basic, Understanding JSX, Props and State, Stateless and Stateful Components, Component life cycle, Hooks, react-router vs react-router-dom, Connecting React with mongodB: Google Material UI, AppBar, Material UI's Toolbar, NavBar, Material UI Buttons, SQL and Complex Transactions, Dynamic Schema, create Index (), get Indexes () & drop Index (), Replication, Statement-based vs. Binary Replication, Auto-Sharding and Integrated Caching, Load balancing, Aggregation, scalability. Node js & Express Framework: Introduction, Environment Setup, serving static resources, template engine with vash and jade, Connecting Node, js to Database, Mongoose Module, Creating Rest APIs, Express Framework, MVC Pattern, Routing, Cookies and Sessions, HTTP Interaction, User Authentication Evolution of DevOps: DevOps Principles, DevOps Lifecycle, DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodology, Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, scrum testing, sprint Planning and Release management, Continuous Integration and Delivery pipeline. CI/CD concepts (GitHub, Jenkins, Sonar): GitHub, Introduction to Git, Version control system, Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes. Course Outcomes — COI Apply the knowledge of ES6 that are vital to implement react application over the web. K3 Implement and understand the impact of web designing by database connectivity with Mongodb. CO2 Implement and understand the impact of server-side scripting language like Nodejs and Express js framework Laterity the benefits of DevOps over other software development processes to Gain insights into the DevOps environment.		Course Contents/Syllabus		
Unit-2 Unit-2 Google Material UI, AppBar, Material UI's Toolbar, NavBar, Material UI Buttons, SQL and Complex Transactions, Dynamic Schema, create Index (), get Indexes () & drop Index (), Replication, Statement-based vs. Binary Replication, Auto-Sharding and Integrated Caching, Load balancing, Aggregation, scalability. Node js & Express Framework: Introduction, Environment Setup, serving static resources, template engine with vash and jade, Connecting Node; js to Database, Mongoose Module, Creating Rest APIs, Express Framework, MVC Pattern, Routing, Cookies and Sessions, HTTP Interaction, User Authentication Evolution of DevOps: DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodology, Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, serum testing, sprint Planning and Release management, Continuous Integration and Delivery pipeline. CI/CD concepts (GitHub, Jenkins, Sonar): GitHub, Introduction to Git, Version control system, Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes. Course Outcomes - CO1	Unit-1	Overview of frameworks, NPM commands, React App, Project Directory Structure, Re Component Basic, Understanding JSX, Props and State, Stateless and Stateful Component		Hours
Unit-3 Introduction, Énvironment Setup, serving static resources, template engine with vash and jade, Connecting Node.js to Database, Mongoose Module, Creating Rest APIs, Express Framework, MVC Pattern, Routing, Cookies and Sessions, HTTP Interaction, User Authentication Evolution of DevOps: DevOps Principles, DevOps Lifecycle, DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodology, Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, scrum testing, sprint Planning and Release management, Continuous Integration and Delivery pipeline. CI/CD concepts (GitHub, Jenkins, Sonar): GitHub, Introduction to Git, Version control system, Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes. Course Outcomes — CO1 Apply the knowledge of ES6 that are vital to implement react application over the web. K3 CO2 Implement and understand the impact of web designing by database connectivity with Mongodb. Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework CO4 Identify the benefits of DevOps over other software development processes to Gain insights into the DevOps environment.	Unit-2	Google Material UI, AppBar, Material UI's Toolbar, NavBar, Material UI Buttons, SQI Complex Transactions, Dynamic Schema, create Index (), get Indexes () & drop Index Replication, Statement-based vs. Binary Replication,		Hours
Unit-4 DevOps Principles, DevOps Lifecycle, DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodology, Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, scrum testing, sprint Planning and Release management, Continuous Integration and Delivery pipeline. CI/CD concepts (GitHub, Jenkins, Sonar): GitHub, Introduction to Git, Version control system, Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes. Course Outcomes — CO1	Unit-3	Introduction, Environment Setup, serving static resources, template engine with vash a jade, Connecting Node.js to Database, Mongoose Module, Creating Rest APIs, Express Framework, MVC Pattern, Routing, Cookies and Sessions, HTTP Interaction, User		Hours
CI/CD concepts (GitHub, Jenkins, Sonar): GitHub, Introduction to Git, Version control system, Jenkins Introduction, Creating Job in Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sonar, Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction to Kubernetes. Course Outcomes — CO1 Apply the knowledge of ES6 that are vital to implement react application over the web. K3 CO2 Implement and understand the impact of web designing by database connectivity with Mongodb. CO3 Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework CO4 Identify the benefits of DevOps over other software development processes to Gain insights into the DevOps environment.	Unit-4	DevOps Principles, DevOps Lifecycle, DevOps Tools, and Benefits of DevOps, SDLC (Software Development Life Cycle) models, Lean, ITIL and Agile Methodo Agile vs DevOps, Process flow of Scrum Methodologies, Project planning, scrum test	ology, sting,	Hours
CO1 Apply the knowledge of ES6 that are vital to implement react application over the web. CO2 Implement and understand the impact of web designing by database connectivity with Mongodb. CO3 Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework CO4 Identify the benefits of DevOps over other software development processes to Gain K2 insights into the DevOps environment.	Unit-5	CI/CD concepts (GitHub, Jenkins, Sonar): GitHub, Introduction to Git, Version control system, Jenkins Introduction, Creating Job Jenkins, adding plugin in Jenkins, Creating Job with Maven & Git, Integration of Sona Dockers, Containers Image: Run, pull, push containers, Container lifecycle, Introduction	o in r,	Hours
CO2 Implement and understand the impact of web designing by database connectivity with Mongodb. CO3 Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework CO4 Identify the benefits of DevOps over other software development processes to Gain K2 insights into the DevOps environment.	Course	Outcomes –		
Mongodb. CO3 Explain, analyze and apply the role of server-side scripting language like Nodejs and Express js framework CO4 Identify the benefits of DevOps over other software development processes to Gain K2 insights into the DevOps environment.	CO1	Apply the knowledge of ES6 that are vital to implement react application over the we	b.	K3
Express js framework CO4 Express js framework Identify the benefits of DevOps over other software development processes to Gain K2 insights into the DevOps environment.	CO2	Implement and understand the impact of web designing by database connectivity with		K3
CO4 Identify the benefits of DevOps over other software development processes to Gain K2 insights into the DevOps environment.	CO3	Explain, analyze and apply the role of server-side scripting language like Nodejs and		K4
	CO4	Identify the benefits of DevOps over other software development processes to Gain		K2
perform Continuous Integration and Continuous Delivery.	CO5	Demonstrate popular open-source tools with features and associated terminology used	l to	K3
Textbooks:	Textboo		L	

- 1. Kirupa Chinnathambi, "Learning React", 2nd Edition 2016, Addison Wesley Publication.
- 2. Mohan Mehul, "Advanced Web Development with React", 2nd Edition 2020, BPB Publications.
- 3. Dhruti Shah, "Comprehensive guide to learn Node.js", 1st Edition, 2018 BPB Publications.
- 4. Jennifer Davis, Ryn Daniels, "Effective DevOps: Building, Collaboration, Affinity, and Tooling at Scale", 1st Edition, 2016, O'Reilly Media Publication.
- 5. John Edward Cooper Berg, "DevOps. Building CI/CD Pipelines with Jenkins, Docker Container, AWS (Amazon Web Services) ECS, JDK 11, Git and Maven 3, Sonar, Nexus", Kindle Edition, 2019, O'Reilly Media Edition.

Reference Books:

- 1. Anthony Accomazzo, Ari Lerner, and Nate Murray, "Fullstack React: The Complete Guide to ReactJS and Friends", 4th edition, 2020 International Publishing.
- 2. David Cho, "Full-Stack React, Type Script, and Node: Build cloud-ready web applications using React 17 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,2017 Publishing Limited.
- 5. Greg Lim," Beginning Node.js, Express & MongoDB Development, kindle edition,2019 international publishing.
- 6. Daniel Perkins, "ReactJS Master React.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/QFaFIcGhPoM?list=PLC3y8-rFHvwgg3vaYJgHGnModB54rxOk3 https://youtu.be/pKd0Rpw7O48 https://youtu.be/TIB eWDSMt4 https://youtu.be/QFaFIcGhPoM https://youtu.be/Kvb0cHWFkdc https://youtu.be/pQcV5CMara8 https://youtu.be/c3Hz1qUUIyO https://youtu.be/Mfp94RjugWO https://youtu.be/SyEQLbbSTWg https://youtu.be/BL132FvcdVM https://youtu.be/fCACk9ziarQ https://youtu.be/YSyFSnisip0 https://youtu.be/7H OH9nipNs https://youtu.be/AX1AP83CuK4 https://voutu.be/2N-59wUIPVI https://youtu.be/hOcFE0RD0cO https://youtu.be/UV16BbPcMQk https://youtu.be/fqMOX6JJhGo https://youtu.be/m0a2CzgLNsc https://youtu.be/1ji 9scA2C4 https://youtu.be/tuIZok81iLk https://youtu.be/IluhOk86prA https://youtu.be/13FpCxCClLY

B. Tech B. Tech Fourth Year VII Semeste	r
Course Code: ACSAI0713	LTP 300
Course Title: Programming for Data Analytics	Credits 3

Course objective: This course aims to equip students with the knowledge of statistical data analysis techniques relevant to business decision-making, empowering them to apply Data Science principles in analyzing and resolving business problems. By the end of the course, students will be well-prepared to make informed decisions in a data-driven business landscape.

Pre-requisites: Basic Knowledge of Python and R

Course Contents / Syllabus		
Unit-1	Basic Data Analysis Using Python/R	8 Hours
	Pandas data structures – Series and Data Frame, Data wrangling using pandas, Statistics with	
	Pandas, Mathematical Computing Using NumPy, Data visualization with Python Descriptive	
	and Inferential Statistics, Introduction to Model Building, Probability and Hypothesis Testing,	
	Sensitivity Analysis, Regular expression: RE packages.	
Unit-2	R Graphical User Interfaces	8 Hours
	Built-in functions, Data Objects-Data Types & Data Structure, Structure of Data Items,	
	Manipulating and Processing Data in R using Dplyr package & Stringr package, Building R	
	Packages, Running and Manipulating Packages, data import and export, attribute and data	
	types, descriptive statistics, exploratory data analysis, Flexdashboard, and R-shiny.	
Unit-3	Data Engineering Foundation	8 Hours
	Connecting to a database (sqlite) using Python, Sending DML and DDL queries and	
	processing the result from a Python Program, Handling error, NOSQL query using	
Unit-4	MongoDB, MongoDB Compass. Introduction to Tensor Flow And AI	8 Hours
UIIIt-4	Introduction, Using TensorFlow for AI Systems, Up and Running with TensorFlow,	0 11041 5
	Understanding TensorFlow Basics, Convolutional Neural Networks, Working with Text and	
	Sequences, and Tensor Board Visualization, Word Vectors, Advanced RNN, and Embedding	
	Visualization. TensorFlow Abstractions and Simplifications, Queues, Threads, and Reading	
	Data, Distributed TensorFlow, Exporting and Serving Models with TensorFlow.	
Unit-5	Deep Learning with Keras	8 Hours
	Introducing Advanced Deep Learning with Keras, Deep Neural Networks, Autoencoders,	
	Generative Adversarial Networks (GANs), Improved GANs, Disentangled Representation	
	GANs, Cross-Domain GANs, Variational Autoencoders (VAEs), Deep Reinforcement	
	Learning, Policy Gradient Methods.	
Course or	Itcome: After completion of this course students will be able to:	
Course of	techne. After completion of this course students will be able to.	
CO1	Install, Code and Use Python & R Programming Language in R Studio IDE to perform	K1
	basic tasks on Vectors, Matrices and Data frames.	
CO2	·	1/2
CO2	Implement the concept of the R packages.	K3
CO3	Understand the basic concept of the MongoDB.	K2
CO4	Understand and apply the concept of the RNN and tensorflow.	K4

CO5	Understand and evaluate the concept of the keras in deep learning.	K5
Textbook	s:	1
	Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data y Publishers, 2007.	a Mining,
2.Learnin	g TensorFlow by Tom Hope, Yehezkel S. Resheff, Itay Lieder O'Reilly Media, Inc.	
	ed Deep Learning with TensorFlow 2 and Keras: Apply DL, GANs, VAEs, deep RL, unobject detection and segmentation, and more, 2nd Edition.	supervised
	Myatt, Making sense of Data: A practical Guide to Exploratory Data Analysis and Data y Publishers, 2007.	a Mining,
Referenc	e Books:	
1. Boris Wrox,	ublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", 1 st Ed 2013.	lition,
2. Chris	Eaton, Dirk Deroos et. al., "Understanding Big data", Indian Edition, McGraw Hill, 201	5.
3. Tom V	White, "HADOOP: The definitive Guide", 3 rd Edition, O Reilly, 2012	
Links:		
https://ww	vw.ibm.com/cloud/blog/python-vs-r	
https://ww	vw.youtube.com/watch?v=C5R5SdYzQBI	
https://he	odata.com/learn/data-engineering-and-data-engineers/	

https://www.youtube.com/watch?v=IjEZmH7byZQ

https://www.youtube.com/watch?v=pWp3PhYI-OU