

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(An Autonomous Institute)



Affiliated to

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



Evaluation Scheme & Syllabus

For

B.Tech in Computer Science & Engineering (Data Scienc)

Fourth Year

(Effective from the Session: 2026-27)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute)

B. TECH CSE(Data Science)
Evaluation Scheme
SEMESTER VII

Sl. No.	Subject Codes	Subject Name	Type of Subject	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
WEEKS COMPULSORY INDUCTION PROGRAM														
1	BCSML0702	Deep Learning	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	BCSML0752	Deep Learning Lab	Mandatory	0	0	2				25		25	50	1
6	BCSE0759	Summer Internship Assessment	Mandatory	0	0	2				50			50	1
7	BCSE0758	Capstone Project-I	Mandatory	0	0	4				50		50	100	2
8		MOOCs	*MOOCs											
		TOTAL		12	0	8	120	80	200	125	400	75	800	16

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 MOOCs Based Recommended Courses for final year B. Tech Students**

S. No.	Subject Code	Course Name	University/ Industry Partner Name	N. of Hours	Credits
1.	BMC0111	Deep Learning for Developers	Infosys Wingspan (Infosys Springboard)	34h 51m	2.5
2.	BMC0093	Natural Language Processing using Python	Infosys Wingspan (Infosys Springboard)	15h 45m	1
3	BMC0138	Spring Boot and Angular-React Stack-DevOps Tools and Capstone Project	Infosys Wingspan (Infosys Springboard)	107h 50m	4
4	BMC0147	Java Web Services JWS Training	Infosys Wingspan (Infosys Springboard)	19h 25m	1.5

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List of Department Elective :-

S.No.	Subject Code	Subject Name	Type of Subject	Bucket Name	Semester
1	BCSDS0711	Business Analytics	Departmental Elective-V	Data Analytics	VII
2	BCSE0713	Web Development using MERN STACK with DevOps	Departmental Elective-V	Full Stack	VII

B. TECH CSE(Data Science)
Evaluation Scheme
SEMESTER VIII

Sl. No.	Subject Codes	Subject Name	Type of subject	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1		Open Elective-IV	Open Elective	2	0	0	30	20	50		50		100	2
2	BCSE0858/ BCSE0859	Capstone Project / Industrial Internship	Mandatory	0	0	16				200		200	400	8
3		MOOCs*	*MOOCs											
		TOTAL		2	0	16	30	20	50	200	50	200	500	10
Mini Project or Internship (3-4 weeks) shall be conducted during summer break after VI semester and will be assessed during VII semester														

*** List of MOOCs Based Recommended Courses for final year B. Tech Students**

S. No.	Subject Code	Course Name	University/ Industry Partner Name	N. of Hours	Credits
1	BMC0166	Spring Security	Infosys Wingspan (Infosys Springboard)	8h 38m	0.5
2	BMC0167	Introduction to Apache Spark Streaming	Infosys Wingspan (Infosys Springboard)	32h	2.5
3	BMC0168	Data Analysis using Pig	Infosys Wingspan (Infosys Springboard)	16h	1
4	BMC0045	Microsoft Power BI	Infosys Wingspan (Infosys Springboard)	11h 32m	0.5

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

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AICTE Guidelines in Model Curriculum:

A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Infosys Springboard/NASSCOM/CISCO (as applicable) 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 Infosys Springboard/NASSCOM/CISCO (as applicable) 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

What is computer vision? Why Convolutions (CNN)? Introduction to CNN, Train a simple convolutional neuralnet, Explore the design space for convolutional nets, Pooling layer motivation in CNN, Design a convolutionallayered application, Understanding and visualizing a CNN, Transfer learning and fine-tuning CNN, Imageclassification, Text classification, Image classification and hyper-parameter tuning, Emerging NN architectures.		
Unit 3	DETECTION & RECOGNITION	8 hours
Padding & Edge Detection, Strided Convolutions, Networks in Networks and 1x1Convolutions, InceptionNetwork Motivation, Object Detection, YOLO Algorithm.Different types of RNNs, Language model and sequence generation, Sampling novel sequences, Vanishinggradients with RNNs, Gated Recurrent Unit (GRU), Long Short-Term Memory (LSTM), Bidirectional RNN,Deep RNNs		
Unit 4	RECURRENT NEURAL NETWORKS	8 hours
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, Vanishinggradients with RNNs, Gated Recurrent Unit (GRU), Long Short-Term Memory (LSTM), Bidirectional RNN,Deep RNNs		
Unit 5	AUTOENCODERS IN DEEP LEARNING	8 hours
Auto-encoders and unsupervised learning, Stacked auto-encoders and semi-supervised learning, Regularization - Dropout and Batch normalization.,		
Total Lecture Hours		40 hours
Textbook: 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 Editions, 1th Edition Pearson Reference Books: 1. Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola “Dive into Deep Learning”, Release0.17.4 2. Artificial Intelligence: A Modern Approach. Prentice Hall Series in Arti Russell, S. and Norvig, N. ArtiIntelligence. 2003.		
NPTEL/ YouTube/ Faculty Video Link:		
Self-Study Content Links:		Duration (in Hrs)
1. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012782105116811264219_shared/overview https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01274814254931148859_shared/overview		39 hrs (Moocs)
Unit 1	(371) Lec-1 Introduction to Artificial Neural Networks - YouTube (3) Deep Learning(CS7015): Lec 8.1 Bias and Variance - YouTube (3) Mod-10 Lec-39 Assessing Learnt classifiers; Cross Validation; - YouTube (3) Lec-1 Introduction to Artificial Neural Networks - YouTube (3) Lec-2 Artificial Neuron Model and Linear Regression – YouTube (3) Evaluation and Cross-Validation – YouTube	1 hrs
Unit 2	(3) Lecture 1 Introduction to Convolutional Neural Networks for Visual Recognition - YouTube (3) Lecture 2 Image Classification - YouTube (3) Lecture 3 Loss Functions and Optimization - YouTube	2hrs

	(3) Hyperparameter optimization – YouTube (3) Deep Learning(CS7015): Lec 11.3 Convolutional Neural Networks - YouTube		
Unit 3	(3) C4W3L09 YOLO Algorithm - YouTube (3) Edge Detection - YouTube (3) Neural Networks - Networks in Networks and 1x1 Convolutions – YouTube	1hrs	
Unit 4	(3) Backpropagation in CNNs - YouTube (3) Deep RNNs and Bi- RNNs - YouTube (3) Deep Learning(CS7015): Lec 13.4 The problem of Exploding and Vanishing Gradients - YouTube (3) Deep Learning(CS7015): Lec 14.2 Long Short Term Memory(LSTM) and Gated Recurrent Units(GRUs) – YouTube	2 hrs	
Unit 5	(3) Deep Learning(CS7015): Lec 7.1 Introduction to Autoencoders - YouTube (3) Deep Learning(CS7015): Lec 9.5 Batch Normalization - YouTube (3) Deep Learning(CS7015): Lec 7.3 Regularization in autoencoders (Motivation) – YouTube	2hrs	
	Note: Self-study material may include assignments, seminars, micro projects, industrial visits, any other student activities, etc	10 hrs	

Course Code: BCSDS0711					Course Name: Business Analytics							L	T	P	C
Course Offered in: CSE(DS)/CSE/CS/IT/CSIT/CSE(AI)/CSE(AIML)/ECE/EEE/ELCE/ME												3	0	0	3
Pre-requisite: Basic knowledge of statistics, database systems, and spreadsheet tools such as Microsoft Excel.															
Course Objectives: The Objective of this course is to provide knowledge of concepts and fundamentals of Business Analytics and Data Warehousing, to introduce data warehousing techniques and their applications in Business Analytics, to develop understanding of business data analysis using statistical methods to familiarize students with different levels of business analytics using R Programming and to enable development of dashboards and reports for business decision-making.															
Course Outcome: After completion of the course, the student will be able to												Blooms level			
CO1	Understand concepts of Business Analytics and Data Warehousing														K2
CO2	Apply data ware housing techniques for Business Analytics														K3
CO3	Analyze business data using statistical methods.														K4
CO4	Evaluate different level of business analytics using R Programming.														K5
CO5	Develop dashboards and reports														K6
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	2	1	2	2	-	-	-	-	-	2	3	2	-	
CO2	2	3	2	2	3	-	-	-	-	1	2	3	3	-	
CO3	2	3	1	3	2	-	-	-	-	-	2	3	2	-	
CO4	2	2	2	3	3	-	-	-	-	1	2	3	3	-	
CO5	1	2	3	2	3	-	-	2	3	2	2	2	3	2	
Course Contents / Syllabus															
Unit 1			Introduction to Business Analytics											09 hours	
Business Analytics: Definition, Importance, Scope. Types of Analytics: Descriptive and Diagnostic. Business Analytics vs Business Intelligence. Role of Data in Decision Making. Applications and Analytics Lifecycle.															
Unit 2			Data Warehousing											09 hours	
Data Warehouse Architecture: Fundamentals of Data Warehouse, Components of Data Warehouse, Three-Tier Architecture, Data Warehouse Models, Data Integration Techniques, Data Storage and Organization, OLTP vs OLAP Systems: ETL Process, Data Marts, Metadata, Star and Snowflake Schema, fact constellation schema.															
Unit 3			Business Statistics											09 hours	
Descriptive statistics: Definition and importance, Types, Measures of central tendency, dispersion, shape, Probability distributions: Basic concepts of probability, Random variables, Probability distribution functions, Expected value and variance, Applications in business decision-making, Sampling: Population vs Sample, Sampling techniques, Sampling distribution, Hypothesis testing: Concept of hypothesis, Types of errors, Statistical tests, Decision-making using hypothesis testing, Correlation, Regression, Time series basics.															

Unit 4	R Programming for Business Analytics	09 hours
Business Analytics Life Cycle, Model deployment, Steps in Problem Solving Process, Software used in Business Analytics, Getting Started with R. Data Manipulation & Statistics: Basics, Merging, Data Creation, Quantiles, Calculating Variance, Calculating Covariance, Cumulative Frequency, Library (mass), Head (faithful), Scatter Plot, Control Flow. Business Analytics using R: Normal PDF, Not Normal, SAT Example, Example- Birth Weights, dNorm, pNorm, qNorm, Understanding Estimation, Properties of Good Estimators, Central Limit Theorem, Kurtosis, Constructing Central Limit Theorem, Confidence Intervals for the Mean, Confidence Intervals Examples, t-distribution		
Unit 5	Dashboard Tools for Business Analytics: Zoho Analytics/Power Bi/ Tableau	09 hours
Getting started with Zoho Analytics - Terminologies & Workflows, Importing Data From Files, Feeds, and Cloud Storage, Data Modeling Building powerful Formulas Formatting Tables & Custom Sorting Lookups & Data Blending, Creating Reports Building Charts, Pivot Tables, Tabular Views, and Summary Tables Applying Filters Customizing Reports Chart picker guide, Creating Dashboards Creating a Dashboard Adding KPI Widgets Adding User Filters Customizing Dashboards Timeline Filter and Merging User Filters.		
Total Lecture Hours		45 hours
Text Books: 1. Business Statistics – S.C. Gupta & V.K. Kapoor 2. Fundamentals of Data Warehousing – Paulraj Ponniah 3. Business Analytics – James Evans		
Reference Books: 1. Data Warehousing in the Real World – Sam Anahory 2. Excel Data Analysis – Wayne Winston 3. Data Warehouse Toolkit – Ralph Kimball		
Self-Study Content Links:		Duration (in Hrs)
MOOCs	1. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0138418214952222724874_shared/overview (8 hours 26 Min) 2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384293374172364827469_shared/overview (6 Hours 57 minute)	15.38 hours
Video Lectures	1. https://youtu.be/BSJRH3njZEE?si=qIM99oq-5-rNLk51 (1.11 hours) 2. https://www.youtube.com/live/fGaJru-1fjl?si=CRUwLz8NEUSvPY3X (2hours 32 minutes) 3. https://youtu.be/vEM4YnRFGoA?si=tasXrN0jly_DkbQE (11 hours) 4. https://youtu.be/fDRa82lxzaU?si=C1cmExJuTkZRgNXf (1 hours) 5. https://www.youtube.com/live/ZR4e8fbVpp4?si=A8DOORxLKn7Qpzpg	15 hours 32 minutes

Web References	Reference Taken from: https://www.bmu.edu.in/social/delve-into-the-mba-in-business-analytics-syllabus-subjects/#Module_1 https://www.depaul.edu/academics/programs/business-analytics-ms?utm_content=772307929901&utm_term=business%20analytics%20universities%20usa&utm_medium=cpc&utm_source=google&utm_campaign=extm_international-nonbrand&gclid=aw.ds&gad_source=1&gad_campaignid=22975247660&gbraid=0AAAAADlwX73S3SFQuWnG_AxmtiVHO1Z8z&gclid=CjwKCAjwwJzPBhBREiwAJfHRnLC70RK4_t99A9YQ2ggDt8bLEiP3tvAFr7pTdVeDFjrHPRPd0ysNB0CijMQAvD_B_wE https://sunstone.in/blog/mba-in-business-analytics-syllabus https://www.onlinemanipal.com/blogs/mba-in-business-analytics-subjects-list https://www.eicta.iitk.ac.in/knowledge-hub/data-analytics/business-analytics-course-syllabus https://noida.amity.edu/blog/academics/mba-in-business-analytics-syllabus-scope-colleges-and-career-opportunities https://management.buffalo.edu/degree-programs/master-of-science-ms/business-analytics/campaigns/ub-msba-landing-page-google.html?utm_source=google&utm_medium=cpc&utm_campaign=FM-PPC-UB-SOM-MS-BusinessAnalytics-International-Program&gad_source=1&gad_campaignid=13724693728&gbraid=0AAAAADiSHE8chFADxOw5S7ybamtDqOhQ&gclid=CjwKCAjwwJzPBhBREiwAJfHRnXo9xd0l9ldhL1kZLNhxWW8F4rc3cWTbT2ApiuzLk02Ze7BT4Bws_BoChtAQAvD_BwE https://admission.isb.edu/admissions/amp/ampba/?utm_source=google&utm_medium=cpc&utm_campaign=AMPBA-B26_Google_Generic-Search_AI-Max_CPC_LP_GT&keyword=business%20analytics%20course&term={searchterm}&utm_source=google&utm_medium=cpc&campaignname=&adgroupname=Business_(Broad-Phrase)&keyword=business%20analytics%20course&term={searchterm}&creative=799773152771&devicemodel=&target=&device=c&network=g&matchtype=b&placement=&gclid=CjwKCAjwwJzPBhBREiwAJfHRnTC534j8TIwCVE55FA0ncZmj5yfvFg1htT4T2Nhw2UB7KCBOs0IQIRoCAE4QAvD_BwE&gad_source=1&gad_campaignid=23639572256&gbraid=0AAAAABbtIpHKOhPhwiiAmtWB77e5nGEVei&gclid=CjwKCAjwwJzPBhBREiwAJfHRnTC534j8TIwCVE55FA0ncZmj5yfvFg1htT4T2Nhw2UB7KCBOs0IQIRoCAE4QAvD_BwE	10hours
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Course Code: BCSE0713						Course Name: Web Development using MERN STACK with Devops						L	T	P	C
Course Offered in: CSE/CS/IT/CSE(AI)/CSE(AIML)/CSE(DS)/CSE-R/M.Tech int												3	0	0	3
Pre-requisite: Basic knowledge of HTML, CSS, JavaScript, and fundamental programming concepts in any language.															
Course Objectives: This course aims to equip students with practical skills in building dynamic full-stack applications using React, Node.js, Express, and MongoDB. It also introduces DevOps principles, Agile methodologies, and CI/CD automation using tools like GitHub, Jenkins, Docker, and Kubernetes.															
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)			
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 Mongoddb.											K3			
CO3	Explain, analyze and apply the role of server side scripting language like Nodejs and Express js framework.											K4			
CO4	Apply the benefits of DevOps over other software development processes to Gain insights into the DevOps environment.											K4			
CO5	Demonstrate popular open-source tools with features and associated terminology used to perform Continuous Integration and Continuous Delivery.											K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	2	3	1	3	1	1	-	1	-	2	2	2	3	
CO2	3	2	3	1	3	1	1	-	1	-	2	2	2	3	
CO3	3	2	3	1	3	1	1	2	1	2	2	2	2	2	
CO4	3	1	1	1	3	2	-	-	2	1	2	2	1	2	
CO5	3	1	1	1	3	1	-	-	2	1	2	2	1	3	
Course Contents / Syllabus															
Module 1				Modern Frontend Development with React JS										8 hours	
Introduction: to React, Setting up React projects, React Folder Structure, JSX, Functional Components, and React Hooks (useState, useEffect, use Context), Props vs State, Stateless vs Stateful Components, Component Lifecycle, Routing with react-router-dom Introduction to Next.js for Server-Side Rendering and SEO, Integrating APIs with axios or fetch,.															
Module 2				UI Libraries & MongoDB Integration										8 hours	
UI Libraries : Introduction to Google Material UI, Tailwind CSS, Theming and responsive design with MUI, Creating reusable UI components (Navbar, Toolbar, Dialogs), Introduction to MongoDB, CRUD Operations using Mongoose Indexes: Creating, Getting, Dropping, Aggregation Pipelines and Query Optimization, Data Modeling & Relationships, Auto-Sharding and Replication Concepts, Modern MongoDB tools: MongoDB Atlas, Compass.															
Module 3				Backend with Node.js & Express										8 hours	
Node.js: Introduction to Node.js Setting up Express applications, Routing & Middleware, Restful API Design , JWT-based Authentication & Authorization ,Working with dotenv, CORS, body-parser. Express MVC Architecture in Express, File Upload Handling with Multer, Connecting Frontend with Backend via APIs, Introduction to GraphQL.															
Module 4				DevOps Culture and Lifecycle										8 hours	
Introduction to DevOps: Culture & Principles, DevOps Lifecycle and Agile vs DevOps, SDLC Models: Agile, Lean, Scrum, Kanban, Scrum: Process flow, Planning, Testing, Release Management, Introduction to Site Reliability Engineering (SRE), Overview of Terraform/Ansible, Configuration Management basics															
Module 5				CI/CD, Docker & Kubernetes										8 hours	
Git & GitHub: Introduction to Git, GitHub, Branching strategies, CI/CD Pipelines: Jenkins, GitHub Actions, Creating Jenkins Jobs and Pipelines, Integrating Git, Maven, and SonarQube, Introduction to Docker: Images, Containers, Lifecycle ,Building custom Docker Images, Docker Compose for multi-container apps, Container orchestration with Kubernetes Creating Deployments, Services, and scaling with K8s, Basic monitoring tools: Prometheus and Grafana															
Total Lecture Hours														40 hours	
Textbook:															

S.No	Book Title	Author
1.	Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node Paperback, 2 nd Edition (2017)	Vasan Subramanian
2.	Hands-On MERN Stack Web Development: Build production-grade web apps and APIs with MERN stack ,3 rd Edition (2019)	Shama Hoque
3.	Beginning MERN Stack: Build and Deploy a Full Stack MongoDB, Express, React, Node.js App 2 nd Edition (2021)	Greg Lim

Reference Books:

S.No	Book Title	Author
1.	The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations 2nd Edition (2003).	Gene Kim, Jez Humble, Patrick Debois, John Willis
2.	Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation, 2nd Edition (2004).	Jez Humble, David Farley
3.	Test and Deploy Production-Grade Web Applications 1st Edition (2023).	Nabendu Biswas

NPTEL/ Youtube/ Faculty Video Link:

Unit 1	https://youtu.be/CvCiNeLnZ00
Unit 2	https://youtu.be/4nKWREmCvsE
Unit 3	https://youtu.be/f2EqECiTBL8
Unit 4	https://youtu.be/6GQRb4fGvtk
Unit 5	https://youtu.be/kTp5xUcalw

Mode of Evaluation

CIE							ESE	Total
ST1	ST2	ST3	TA1 5	TA2 5	TA3 5	Attendance 5		
30			20				100	150

LAB Course Name: WEB DEVELOPMENT USING MERN STACK with Devops.															
Course Offered in: CSE/CS/CSR-R/M.TECH(INT) /IT//CSE(AI)/CSE(AI ML)/CSE(DS)/CSE(CS)															
Pre-requisite: Basic knowledge of HTML, CSS, JavaScript, and fundamental programming concepts in any language															
Course Objectives:															
This course aims to equip students with practical skills in building dynamic full-stack applications using React, Node.js, Express, and MongoDB. It also introduces DevOps principles, Agile methodologies, and CI/CD automation using tools like GitHub, Jenkins, Docker, and Kubernetes.															
Course Outcome: After completion of the course, the student will be able to															
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 Mongoddb.														
CO3	Explain, analyze, and apply server-side scripting using Node.js and the Express.js framework while identifying the benefits of DevOps practices and gaining insights into the DevOps environment for modern software development and deployment.Demonstrate popular open-source tools with features and associated terminology used to perform Continuous Integration and Continuous Delivery.														
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	2	3	1	3	1	1	-	1	-	2	2	2	3	
CO2	3	2	3	1	3	1	1	-	1	-	2	2	2	3	
CO3	3	2	3	1	3	1	1	2	1	2	2	2	2	2	

Lab No.	Unit	Topic	Program Logic Building	CO Mapping
1.1	I	Project setup, folder structure	Program: Set up a new React project using create-react- app and display “Welcome to React Workshop”. Concept: Project setup, folder structure understanding.	C01
1.2	I	functional component	Program: Create and use functional components with JSX to display user profile information. Concept: JSX and functional component structure.	C01

1.3	I	React Hooks	Program: Use useState to create a counter application with increment/decrement buttons. Concept: React Hooks for local state management.	CO1
1.4	I	useEffect	Program: Use useEffect to fetch and display user data from a placeholder API on component load. Concept: Side effects and API calls.	CO1
1.5	I	useContext	Program: Implement useContext to manage theme switching (light/dark) across components. Concept: Global state sharing using Context API.	CO1
1.6	I	Props vs State	Program: Create parent and child components; pass data using props and update using state. Concept: Props vs State demonstration.	CO1
1.7	I	Component design pattern understanding	Program: Create both stateless and stateful components to show the difference in data handling. Concept: Component design pattern understanding.	CO1
1.8	I	react-router-dom	Program: Implement routing with react-router-dom to navigate between Home, About, and Contact pages. Concept: Client-side routing in React.	CO1
1.9	I	Next.js app	Program: Create a simple Next.js app with server- side rendered homepage and blog page using get ServerSideProps. Concept: Introduction to SSR and SEO in Next.js.	CO1
1.1	I	API integration and rendering	Program: Use axios to fetch a list of movies from a public API and display them using a card component. Concept: API integration and rendering dynamic data.	CO1

2.1	2	Google Material UI	Program: Create a basic React UI using Google Material UI with a themed button and typography. Concept: Intro to Material UI and theming.	CO2
2.2	2	Tailwind utilities.	Program: Create a responsive layout using Tailwind CSS for a product landing page. Concept: Responsive design using Tailwind utilities.	CO2
2.3	2	Navbar and Toolbar using Material UI	Program: Build reusable UI components: Navbar and Toolbar using Material UI components. Concept: Component reuse and MUI layout.	CO2
2.4	2	modal interactions,	Program: Create a Dialog box with form using Material UI that opens and closes on button click. Concept: MUI Dialog and modal interactions.	CO2
2.5	2	MongoDB setup	Program: Connect Node.js with MongoDB using Mongoose and create a "students" collection. Concept: MongoDB setup and Mongoose schema.	CO2
2.6	2	Mongoose-based data handling	Program: Perform CRUD operations (Create, Read, Update, Delete) on a "books" collection using Mongoose. Concept: Mongoose-based data handling.	CO2
2.7	2	MongoDB indexes for query optimization	Program: Create and drop indexes on a "users" collection and perform a query using the indexed field. Concept: MongoDB indexes for query optimization.	CO2
2.8	2	Data aggregation and grouping in MongoDB.	Program: Use aggregation pipeline to compute the average price of products by category. Concept: Data aggregation and grouping in MongoDB.	CO2

2.9	2	Data modeling	Program: Model 1-to-many relationship between "users" and "orders" and fetch nested data. Concept: Data modeling and population using Mongoose.	CO2
2.1	2	MongoDB Atlas cloud database	Program: Set up a MongoDB Atlas cloud database, connect it to a Node.js app, and visualize data using MongoDB Compass. Concept: Cloud-hosted MongoDB setup and visualization tools.	CO2
3.1	3	Node.js and setup	Program: Create a simple Node.js application that prints "Hello from Node" in the terminal. Concept: Introduction to Node.js and setup.	CO3
3.2	3	Express setup and basic routing.	Program: Set up an Express.js server and define a home route that returns a welcome message. Concept: Express setup and basic routing.	CO3
3.3	3	Middleware	Program: Add middleware to log requests and use body- parser to handle POST requests. Concept: Middleware and request body handling.	CO3
3.4	3	Creating Rest APIs	Program: Create RESTful API endpoints to manage a list of books using Express and HTTP methods (GET, POST, PUT, DELETE). Concept: RESTful API design with CRUD operations.	CO3
4.1	4	DevOps Principles	Task: Analyze a given case study (e.g., Netflix or Amazon) and list 5 DevOps principles applied in their pipeline.	CO4
	4	DevOps Tools	Task:	CO4

4.2			Given 3 use-case scenarios, map which SDLC model (Agile, Waterfall, Lean, or Kanban) fits best and why.	
4.3	4	Release management	Task: Write a simple Terraform .tf script to provision an AWS EC2 instance. Concepts: provider, resource, output, init, apply.	CO4
4.4	4	DevOps Tools	Push the local file onto the remote repository using the Git command	CO4
4.5	4	Introduction to Git	Clone a GitHub Repository.	CO4
4.6	4	Delivery pipeline	Creating a simple Job with Maven.	CO4
4.7	4	GitHub	Learn and practice key Docker commands such as: • docker --version • docker pull • docker run • docker ps • docker exec • docker stop	CO4
4.8	4	Docker	Install SonarQube locally or run via Docker, then: • Analyze a sample Java or Python project • Explore SonarQube dashboard • Use sonar-scanner or Maven plugin to send reports	CO4
5.1	5	Jenkins Introduction	Jenkins installation and setup, explore the Jenkin command	CO5
5.2	5	Sonar	Create a Dockerfile, build an image, tag it, and push it to Docker Hub using CLI.	CO5

5.3	5	Jenkins Introduction	Set up a complete CI pipeline: GitHub → Jenkins → Maven Build → Docker Build.	CO5
5.4	5	junit testing	Write simple JUnit tests and configure Jenkins to run them during builds and display reports.	CO5
5.5	5	Introduction to Git Kubernetes	Use Docker volumes, inspect file structures inside containers, and bind host directories.	CO5
5.6	5	Docker image	Create a Node.js or Spring Boot app, containerize it, and run it using Docker.	CO5
5.7	5	Docker	Installation of docker.	CO5

Note: After completing all the laboratory experiments, students are required to obtain a Full Stack Development certification through [ScholarHat](#).

Web References	https://www.scholarhat.com/training/azure-devops-certification-training Azure DevOps Training with Certification (4 Hours) React JS Certification Course Online with Certificate (8 Hours) Free MongoDB Course with Certification Learn MongoDB Online (4 Hours)
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LAB Course Code: BCSML0752							LAB Course Name: Deep Learning Lab						L	T	P	C
Course Offered in: CSE(DS)													0	0	2	1
Pre-requisite: Python, Basic Modeling Concepts.																
Course Objectives:																
Course Outcome: After completion of the course, the student will be able to													Bloom’s Knowledge Level (KL)			
CO1	Develop python programs to work on Data sets and Implement Artificial Neural Network Techniques.												K6			
CO2	Explore different types of tensor and perform exploratory data analysis on different data sets.												K4			
CO3	Apply Automatic Image Captioning with Keras ---Facial Recognition												K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)																
CO-PO Mapping	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO1 0	PO1 1	PSO 1	PSO2	PSO3		
CO1	1	2	1	1	2	-	1	1	3	1	3	-	3	3		
CO2	-	1	1	2	1	1	1	2	3	3	-	-	3	3		
CO3	1	1	1	2	1	3	3	1	1	1	-	1	2	2		
List Of Practical’s (Indicative & Not Limited To)													CO Mapping			
1. Write a program Print Dimensions of dataset.													CO1			
2. Write a program to Calculate of Accuracy Values.													CO1			
3. Write a program to Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.													CO1			
4. Write a program to Compose Matrix Shape and Tensor Shape.													CO2			
5. Write a program to showing Accessing and Manipulation of tensors.													CO2			
6. Write a program to understand the mechanism of practically training a binary classifier													CO2			
7. Implement with a program showing Access and manipulation of tensors.													CO2			
8. Write a program to show Regression Data Sampling													CO2			
9. Write a program to Combat Overfitting.													CO1			
10. Write a program Print Dimensions of dataset.													CO2			
11. Write a program to Calculate of Accuracy Values.													CO2			

12. Write a program to Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.	CO1
13. Write a program to build a simple autoencoder based on a fully-connected layer in Keras	CO3
14. Implement Long Short-Term Memory Networks using sample data	CO1
15. Write a program showing Automatic Image Captioning with Keras ---Facial Recognition.	CO3