

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 Computer Science (CS)

Fourth Year

(Effective from the Session: 2026-27)

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA, G.B. NAGAR**(AN AUTONOMOUS INSTITUTE)****B. TECH (Computer Science)****Evaluation Scheme****SEMESTER VII**

S. 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	BCS0701	Big Data Analytics	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	BCS0751	Big Data Analytics 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

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

S. No.	Subject Code	Course Name	University/ Industry Partner Name	N. of Hours	Credits
1.	BMC0149	Big Data-301	Infosys Wingspan (Infosys Springboard)	34h 42m	2.5
2.	BMC0143	Continuous Integration and Delivery - DevOps	Infosys Wingspan (Infosys Springboard)	46h 41m	3.5

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

S. No.	Subject Code	Subject Name	Type of Subject	Bucket Name	Semester
1	BCSE0712	RPA Implementation	Departmental Elective- V	CRM-RPA	VII
2	BCSDS0711	Business Analytics	Departmental Elective- V	Data Analytics	VII
3	BCSE0713	Web Development using MERN Stack with DevOps	Departmental Elective- V	Full Stack Development	VII
4	BCSAI0713	Program ming for Data Analytics	Departmental Elective- V	Cloud and Big Data	VII

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA, G.B. NAGAR

(AN AUTONOMOUS INSTITUTE)

B. TECH (Computer Science)

Evaluation Scheme

SEMESTER VIII

S. 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
		MOOCs (For B.Tech. Hons. Degree)	*MOOCs											
			TOTAL	2	0	16	30	20	50	200	50	200	500	10

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

S. No.	Subject Code	Course Name	University/ Industry Partner Name	N. of Hours	Credits
1.	BMC0169	Natural Language Processing for developers	Infosys Wingspan (Infosys Springboard)	13h 37m	1
2.	BMC0138	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.

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA
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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



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नोएडा अभियांत्रिकी एवं प्रौद्योगिकी संस्थान, ग्रेटर नोएडा

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Approved by AICTE, Affiliated to Dr. A.P.J. Abdul Kalam Technical University, Lucknow Uttar Pradesh, (Formerly Uttar Pradesh Technical University)



Course Code: BCS0701					Course Name: BIG DATA ANALYTICS								L	T	P	C
Course Offered in: B. Tech. 4 th Year (7 th Semester) Computer Science													3	0	0	3
Pre-requisite: Introduction to LINUX Commands, Java & Python																
Course Objectives:																
To understand the basic concepts of Big Data in the cloud and analyze sample datasets using big data ecosystems.																
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)				
CO1	Identify Big Data and relevance of Big Data Analytics.											K2				
CO2	Analyze Map Reduce and demonstrate its use in features extraction.											K4				
CO3	Explain the YARN and HDLC in Data management											K2				
CO4	Describe Hadoop and Hadoop Eco-System.											K2				
CO5	Evaluate various types of tools in Hadoop by data importing and handling Scenario.											K5				
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)																
CO-PO MAPPING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	3	2	–	–	2	–	–	–	–	–	–	1	3	1	1	
CO2	3	3	1	2	3	–	–	–	–	–	–	2	3	2	2	
CO3	3	2	–	–	3	–	–	–	–	–	–	1	3	2	1	
CO4	3	2	1	–	3	–	–	–	–	–	–	1	3	2	1	
CO5	3	3	2	2	3	–	–	–	–	–	–	2	3	3	2	
Course Contents / Syllabus																
UNIT 1	INTRODUCTION TO BIG DATA											9 HOURS				
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 – security, compliance, auditing and protection, Big Data privacy and ethics, Big Data Analytics, Challenges of conventional systems, intelligent data analysis, nature of data, analytic processes and tools, analysis vs reporting, modern data analytic tools.																
UNIT 2	HADOOP AND MAP REDUCE											9 HOURS				

Hadoop: History of Hadoop, Apache Hadoop, the Hadoop Distributed File System, components of Hadoop, data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, Hadoop Echo System. Map Reduce: Map Reduce framework and basics, how Map Reduce works, developing a Map Reduce application, unit tests with MR unit, test data and local tests, anatomy of a Map Reduce job run, failures, job scheduling, shuffle and sort, task execution, Map Reduce types, input formats, output formats, MapReduce features, Real-world Map Reduce		
UNIT 3	HADOOP ARCHITECTURE	9 HOURS
Hadoop Eco System and YARN: Hadoop ecosystem components, schedulers, fair and capacity, Hadoop 2.0 New Features - NameNode high availability, HDFS federation, MRv2, YARN, Running MRv1 in YARN. HDFS (Hadoop Distributed File System): Design of HDFS, HDFS concepts, benefits and challenges, file sizes, block sizes and block abstraction in HDFS, data replication, how does HDFS store, read, and write files, Java interfaces to HDFS, command-line interface, Hadoop file system interfaces, data flow, data ingest with Flume and Scoop, Hadoop archives, Hadoop I/O: compression, serialization, Avro and file-based data structures.		
UNIT 4	HADOOP FRAMEWORKS	9 HOURS
Hadoop Eco System Frameworks, Applications on Big Data using Pig, Hive, HBase and Zookeeper. Pig - Introduction to PIG, Architecture, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin- Input and output, Relational operators, User defined functions. Working with scripts, Data Processing operators. Hive - Apache Hive architecture and installation, Hive shell, Hive services, Hive metastore, comparison with traditional databases, HiveQL, tables, querying data and user defined functions, sorting and aggregating, Map Reduce scripts, joins & subqueries. HBase – Hbase concepts, clients, example, Hbase vs RDBMS, advanced usage, schema design, advance indexing, Zookeeper – how it helps in monitoring a cluster, how to build applications with Zookeeper.		
UNIT 5	SQOOP, SPARK & SCALA	9 HOURS
Importing and Handling Relational Data in Hadoop using Sqoop: Relational database management in Hadoop: Bi-directional transfer between Hadoop and external database. Import data- Transfer an entire table, import subset data, use different file formats incremental import new data, incrementally import data, preserving the value. Sqoop: Export transfer data from Hadoop, update the data, update at the same time, export subset of columns. Hadoop ecosystem integration- import data to hive, using partitioned hive tables, replace special delimiters. Spark: Installing spark, spark applications, jobs, stages and tasks, Resilient Distributed, Databases, anatomy of a Spark job run, Spark on YARN. SCALA: Introduction, classes and objects, basic types and operators, built-in control structures, functions and closures, inheritance.		
Total Lecture Hours		45 HOURS
Textbook:		
Book Details		Authors Name
<i>Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses,</i> John Wiley & Sons, 1st Edition, 2013		Michael Minelli, Michelle Chambers, and Ambiga Dhiraj
<i>Big Data Black Book,</i> Wiley India, 1st Edition, 2015		DT Editorial Services

<i>Hadoop: The Definitive Guide</i> , O'Reilly Media, 3rd Edition, 2012		Tom White
<i>Hadoop Operations</i> , O'Reilly Media, 1st Edition, 2012		Eric Sammer
<i>Programming Hive</i> , O'Reilly Media, 1st Edition, 2012		Edward Capriolo, Dean Wampler, and Jason Rutherglen
<i>HBase: The Definitive Guide</i> , O'Reilly Media, 1st Edition, 2011		Lars George
Reference Books:		
Book Details		Authors Name
<i>Programming Pig</i> , O'Reilly Media, 1st Edition, 2011		Alan Gates
<i>Big Data Black Book</i> , Wiley India, 1st Edition, 2015		DT Editorial Services
<i>Big Data: A Revolution That Will Transform How We Live, Work, and Think</i> , John Murray Publishers (UK) / Eamon Dolan Books (US), 1st Edition, 2013		Viktor Mayer-Schönberger and Kenneth Cukier
Self-Study Content Links:		Duration (in Hrs)
MOOCs	Big Data-301	34hrs 42min
Video Lectures	https://www.youtube.com/watch?v=rvJgArru8dI	44min
	https://www.youtube.com/watch?v=mNP44rZYiAU	33min
	https://www.youtube.com/watch?v=Qhc6RMaDkgY	44min
	https://www.youtube.com/watch?v=cu2E0sSIWsY	24min
Web References	https://hadoop.apache.org/docs/r1.2.1/hdfs_design.html	
	https://techvidvan.com/tutorials/hadoop-inputformat-introduction/	



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LAB Course Code: BCS0751					LAB Course Name: BIG DATA ANALYTICS LAB								L	T	P	C
Course Offered in: B. Tech. Computer Science													0	0	2	1
Pre-requisite: Fundamentals of JAVA and OOPS Concept.																
Course Objectives: Understand the fundamentals of R programming and apply its syntax, data structures, and built-in functions for statistical computing.																
Course Outcome: After completion of the course, the student will be able to													Bloom’s Knowledge Level (KL)			
CO1	Develop basic R programs and implement statistical techniques on variety of data.												K6			
CO2	Apply visualization techniques on various data sets and explore different types of data and file formats.												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	PO12	PSO1	PSO2	PSO3	
CO1	3	2	3	2	3	–	–	–	–	–	–	2	3	3	2	
CO2	3	2	2	2	3	-	–	–	–	–	–	2	3	2	2	
List Of Practical’s															CO	
1	Installation of VMWare to setup the Hadoop environment and its ecosystems.														CO1	
2	Perform setting up and Installing Hadoop in its three operating modes. a. Standalone. b. Pseudo distributed. c. Fully distributed. Use web-based tools to monitor your Hadoop setup.														CO1	
3	Implementing the basic commands of LINUX Operating System – File/Directory creation, deletion, update operations.														CO1	
4	Perform various File Management tasks in Hadoop. i. Upload and download a file in HDFS. ii. See contents of a file. iii. Copy a file from source to destination. iv. Copy a file from/To Local file system to HDFS. v. Move file from source to destination.														CO1	
	vi. Remove a file or directory in HDFS. vii. Display last few lines of a file viii. Display the aggregate length of a file.															
5	Implement Word Count Map Reduce program to understand Map Reduce Paradigm														CO1	
6	Implement matrix multiplication with Hadoop Map Reduce														CO1	

7	I. Installation of PIG. ii. Write Pig Latin scripts sort, group, join, project, and filter your data.	CO2
8	Run the Pig Latin Scripts to find Word Count. Run the Pig Latin Scripts to find a max temp for every year.	CO2
9	Installation of HIVE. Use Hive to create, alter, and drop databases, tables, views, functions, and indexes	CO2
10	Install Hbase and perform CRUD operations using Hbase Shell.	CO2
11	Implement Spark Core Processing RDD to run Word Count program.	CO2
12	Implement Spark Core Processing RDD to read a table stored in a database and calculate the number of people for every age.	CO2
Total Hours: 30 hrs.		



Course Code: BCSE0712						Course Name: RPA IMPLEMENTATION							L	T	P	C
Course Offered in: B. Tech. 4 th Year (7 th Semester) Computer Science												3	0	0	3	
Pre-requisite: Basic understanding of Web Applications and Desktop Applications.																
Course Objectives:																
This course is designed to give a thorough understanding and practical skills in developing and deploying software robots for Robotic Process Automation (RPA).																
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)				
CO1	Apply basic concepts and methods from design engineering to explore creative solutions of real-world problems.											K3				
CO2	Learn Robotic Process Automation, and massive career opportunity in this field.											K2				
CO3	Implement the knowledge of RPA tools, functions in various industries and perform, control various tasks using RPA bots.											K3				
CO4	Gain expertise in Desktop, Web & Citrix Automation and use Reframework to build a structured business automation process.											K2				
CO5	Develop a real-world workflow automation project and will be able to debug a workflow.											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	PO12	PSO1	PSO2	PSO3	
CO1	3	3	2	1	2	–	–	–	–	–	–	2	3	2	2	
CO2	3	2	–	–	3	–	–	–	–	–	–	2	3	1	2	
CO3	3	3	3	2	3	–	–	–	–	–	–	2	3	3	2	
CO4	3	2	3	2	3	–	–	–	–	–	–	2	3	3	2	
CO5	3	3	3	2	3	–	–	–	1	1	–	3	3	3	3	
Course Contents / Syllabus																
UNIT 1	DATA MANIPULATION											8 HOURS				
Introduction to Data Manipulation, Scalar variables, collections and Tables, Text Manipulation, Data Manipulation, Gathering and Assembling Data Recording and Advanced UI Interaction; Recording Introduction, Basic and Desktop Recording, Web Recording, Input/output Methods, Screen Scraping, Data Scraping, Scraping advanced techniques.																
UNIT 2	SELECTORS											8 HOURS				

Selectors, Defining and Assessing Selectors, Customization, Debugging, Dynamic Selectors, Partial Selectors, RPA Challenge, Image, Text & Advanced Citrix Automation, Introduction to Image & Text Automation, Image-based automation, Keyboard based automation, Information Retrieval, Advanced Citrix Automation challenges, Best Practices using tab for Images Starting Apps.		
UNIT 3	DATA TABLES AND AUTOMATION	8 HOURS
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. Email Automation: Email Automation, Incoming Email automation, Sending Email automation.		
UNIT 4	DEBUGGING AND EXCEPTION HANDLING	8 HOURS
Debugging Tools, Strategies for solving issues, Catching errors. Orchestrator: Tenants, Authentication, Users, Roles, Robots, Environments, Queues & Transactions, Schedules.		
UNIT 5	ROBOTIC FRAMEWORK	8 HOURS
Re-Framework template, Re-Framework template works, Use Re-Framework to automate your own processes. .NET Classes and Objects.		
Total Lecture Hours		40 HOURS
Textbook:		
Book Details		Authors Name
Crisper Learning: For UiPath, <i>Independently Published, Latest Edition, 2018</i>		<i>Vaibhav Jain</i>
Learning Robotic Process Automation, <i>Packt Publishing Ltd., Latest Edition, 2018</i>		<i>Alok Mani Tripathi</i>
Reference Books:		
Book Details		Authors Name
<i>The Simple Implementation Guide to Robotic Process Automation (RPA)</i> , iUniverse Press, Latest Edition		Kelly Wibbenmeyer
<i>It's Time to Automate</i> (eBook), UiPath, Latest Edition		UiPath
Self-Study Content Links:		Duration (in Hrs)
Video Lectures	https://www.youtube.com/playlist?list=PL41Y9S9wmyJarNN2KnB4XudpT1yE1kVd	1hrs+
	https://www.youtube.com/playlist?list=PL41Y9S9wmyLvF6Ou0oPhg6MrFWSw7sn4	1hrs+
	https://www.youtube.com/playlist?list=PL41Y9S9wmyIYX6kciM8DboVYymsv2y6K	1hrs+
	https://www.youtube.com/playlist?list=PL41Y-9S9wmyLeXL1DY9j-XepNb_vg9N8t	1hrs+
	https://www.youtube.com/playlist?list=PL41Y9S9wmyJi2zmWY77yPZrdVI7ab3Ja	1hrs+

Web References	https://docs.uipath.com/studio/standalone/latest/user-guide/supported-applications-and-technologies?utm_source=chatgpt.com https://www.uipath.com/support?utm_source=chatgpt.com	
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Course Code: BCSDS0711					Course Name: BUSINESS ANALYTICS								L	T	P	C
Course Offered in: B. Tech. 4 th Year (7 th Semester) Computer Science													3	0	0	3
Pre-requisite: Basic knowledge of statistics, database systems, and spreadsheet tools such as Microsoft Excel																
Course Objectives:																
1. To provide knowledge of concepts and fundamentals of Business Analytics and Data Warehousing.																
2. To introduce data warehousing techniques and their applications in Business Analytics.																
3. To develop understanding of business data analysis using statistical methods.																
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)				
CO1		Understand concepts of Business Analytics and Data Warehousing.										K2				
CO2		Apply Data Warehousing techniques for Business Analytics.										K3				
CO3		Analyze business data using statistical methods.										K4				
CO4		Evaluate different levels 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	PO12	PSO1	PSO2	PSO3
CO1		3	2	–	–	1	–	–	–	–	–	1	2	2	1	1
CO2		2	3	2	–	3	–	–	–	–	1	1	2	3	2	1
CO3		2	3	2	3	2	–	–	–	–	1	1	2	3	2	1
CO4		2	3	2	2	3	–	–	1	–	1	2	2	3	3	2
CO5		2	2	3	2	3	–	–	1	2	2	2	3	3	3	2
Course Contents / Syllabus																
UNIT 1		INTRODUCTION TO BUSINESS ANALYTICS										9 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										9 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	9 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	9 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	9 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
Textbook:		
Book Details		Authors Name
Business Statistics		S. C. Gupta & V. K. Kapoor
Fundamentals of Data Warehousing		Paulraj Ponniah
Business Analytics		James R. Evans
Reference Books:		
Book Details		Authors Name

Data Warehousing in the Real World		Sam Anahory & Dennis Murray
Excel Data Analysis		Wayne L. Winston
The Data Warehouse Toolkit		Ralph Kimball & Margy Ross
Self-Study Content Links:		Duration (in Hrs)
MOOC'S	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0138418214952222724874_shared/overview	8 HOURS 26 MIN
	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384293374172364827469_shared/overview	6 HOURS 57 MIN
Video Lectures	https://youtu.be/BSJRH3njZEE?si=qIM99oq-5-rNLk51	1.11hours
	https://www.youtube.com/live/fGaJru1fjI?si=CRUwLz8NEUSvPY3X	2hours 32 min
	https://youtu.be/vEM4YnRFGoA?si=tasXrN0jly_DkbQF	11 hours
	https://youtu.be/fDRa82lxzaU?si=C1cmExJuTkZRgNXf	1hours
	https://www.youtube.com/live/ZR4e8fbVpp4?si=A8DOORxLKn7Qpzpg	15hours 32min

Course Code: BCSE0713				Course Name: WEB DEVELOPMENT USING MERN STACK WITH DEVOPS									L	T	P	C
Course Offered in: B. Tech. 4 th Year (7 th Semester) Computer Science													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 Mongodb.												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	PO12	PSO1	PSO2	PSO3	
CO1	3	2	3	1	3	1	1	-	1	-	2	1	2	2	3	
CO2	3	2	3	1	3	1	1	-	1	-	2	1	2	2	3	
CO3	3	2	3	1	3	1	1	2	1	2	2	1	2	2	2	
CO4	3	1	1	1	3	2	-	-	2	1	2	2	2	1	2	
CO5	3	1	1	1	3	1	-	-	2	1	2	2	2	1	3	
Course Contents / Syllabus																
UNIT 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.																

UNIT 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.		
UNIT 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.		
UNIT 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		
UNIT 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:		
Book Details		Authors Name
<i>Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node Paperback, 2nd Edition (2017)</i>		<i>Vasan Subramanian</i>
<i>Hands-On MERN Stack Web Development: Build production-grade web apps and APIs with MERN stack ,3rd Edition (2019)</i>		<i>Shama Hoque</i>
<i>Beginning MERN Stack: Build and Deploy a Full Stack MongoDB, Express, React, Node.js App 2nd Edition (2021)</i>		<i>Greg Lim</i>
Reference Books:		
Book Details		Authors Name
<i>The DevOps Handbook: How to Create World-Class Agility, Reliability, & Security in Technology Organizations 2nd Edition (2003).</i>		<i>Gene Kim, Jez Humble, Patrick Debois, John Willis</i>

<i>Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation, 2nd Edition (2004).</i>		<i>Jez Humble, David Farley</i>
<i>Test and Deploy Production-Grade Web Applications 1st Edition (2023).</i>		<i>Nabendu Biswas</i>
Self-Study Content Links:		Duration (in Hrs)
MOOC'S	https://www.coursera.org/learn/fullstack-web-development https://www.coursera.org/professional-certificates/ibm-full-stack-clouddeveloper	4 Week 6 months
VIDEO LECTURES	https://youtu.be/CvCiNeLnZ00 https://youtu.be/4nKWREmCvsE https://youtu.be/f2EqECiTBL8 https://youtu.be/6GQRb4fGvtk https://youtu.be/kTp5xUtcaw	8 hrs 25 Min 7 hrs 8 Min 6 hrs
WEB REFERENCES	https://react.dev https://docs.docker.com	

Course Code: BCSAI0713				Course Name: PROGRAMMING FOR DATA ANALYTICS									L	T	P	C
Course Offered in: B. Tech. 4 th Year (7 th Semester) Computer Science													3	0	0	3
Pre-requisite: Basic Knowledge of Python and R																
Course Objectives:																
Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.																
Apply principles of Data Science to the analysis of business problems. Use data mining software to solve real-world problems.																
Employ cutting edge tools and technologies to analyze Big Data.																
Course Outcome: After completion of the course, the student will be able to													Bloom’s Knowledge Level (KL)			
CO1	Install, Code and Use Python & R Programming Language in R Studio IDE to perform basic tasks on Vectors, Matrices and Data frames.												K2			
CO2	Implement the concept of the R packages.												K3			
CO3	Understand the basic concept of the MongoDB.												K2			
CO4	Apply the concept of the RNN and tensorflow.												K3			
CO5	Evaluate the concept of the keras in deep learning.												K5			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)																
CO-PO MAPPING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
CO1	3	2	1	–	3	–	–	–	1	–	–	2	3	2	1	
CO2	2	3	2	1	3	–	–	–	2	–	–	2	3	3	2	
CO3	2	3	1	1	3	–	–	–	1	–	–	2	3	2	1	
CO4	2	3	3	2	3	–	–	1	2	–	–	2	3	3	2	
CO5	2	3	3	3	3	–	1	2	2	–	–	3	3	3	3	
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, Flex dashboard 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 MongoDB, MongoDB Compass.		
UNIT 4	INTRODUCTION TO TENSOR FLOW AND AI	8 HOURS
Introduction, Using TensorFlow for AI Systems, Up and Running with TensorFlow, Understanding TensorFlow Basics, Convolutional Neural Networks, Working with Text and Sequences, and 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.		
Total Lecture Hours		40 HOURS
Textbook:		
Book Details		Authors Name
Making Sense of Data: A Practical Guide to Exploratory Data Analysis and Data Mining, <i>1st Edition, John Wiley & Sons, 2007</i>		<i>Glenn J. Myatt</i>
Learning TensorFlow: A Guide to Building Deep Learning Systems, <i>1st Edition, O'Reilly Media, 2017</i>		<i>Tom Hope, Yehezkel S. Resheff, Itay Lieder</i>
Advanced Deep Learning with TensorFlow 2 and Keras: Apply Deep Learning, GANs, VAEs, Deep Reinforcement Learning, Unsupervised Learning, Object Detection and Segmentation, and More, <i>2nd Edition, Packt Publishing, 2021</i>		<i>Rowel Atienza</i>
Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter, <i>3rd Edition, O'Reilly Media, 2022</i>		<i>Wes McKinney</i>
Reference Books:		
Book Details		Authors Name
<i>Professional Hadoop Solutions, 1st Edition, Wrox, 2013</i>		Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich
Understanding Big Data, <i>Indian Edition, McGraw-Hill Education, 2015</i>		<i>Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos</i>
Hadoop: The Definitive Guide, <i>3rd Edition, O'Reilly Media, 2012</i>		<i>Tom White</i>
Self-Study Content Links:		Duration (in Hrs)

Video Lectures	https://www.ibm.com/cloud/blog/python-vs-r	1hrs+
	https://www.youtube.com/watch?v=C5R5SdYzQBI	1hrs+
	https://hevodata.com/learn/data-engineering-and-data-engineers/	1hrs+
	https://www.youtube.com/watch?v=IjEZmH7byZQ	1hrs+
	https://www.youtube.com/watch?v=pWp3PhYI-OU	1HRS+
Web References		