SANJEEV AGRAWAL GLOBAL EDUCATIONAL (SAGE) UNIVERSITY, BHOPAL

Scheme & Syllabus

for

Bachelor of Technology CSE (Hons) –Data Science With LITHAN

SAGE School of Advanced Computing

2021-22 Batch

Bachelor of Technology CSE (Hons)- Data Science

4 Years Degree Program

Program Educational Objectives (PEOs)

PEO-1: Graduates shall have the ability to apply knowledge across the disciplines and in emerging areas of Computer Science and Engineering such as for higher studies, research, employability, full stack web development, and artificial intelligence solutions to handle the realistic problems.

PEO-2: Graduates shall have good communication skills, possess ethical conduct, sense of responsibility to serve the society and protect the environment.

PEO-3: Graduates shall possess academic excellence with high ethical values, soft skills, managerial skills, leadership qualities, knowledge of contemporary issues and understand the need for lifelong learning for a successful professional career.

PEO-4: To imbibe in graduates the team-spirit and problem-solving skills so they can lead organizations they join in or initiate their own ventures.

PEO-5: To disseminate the ability to analyze the requirements, understand the technical specifications and design the innovative solutions by applying the principles of computing.

Program Outcomes (POs):

PO-1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

First Semester															
Course Code	**Course Title**	**Contact Hours per Week**			**Credits**	**ESE Duration**	**Theory**						**Practical**			
		L	**T**	**P**			**MSE**	**ASG**	**TA**	**ATTD**	**ESE**	**Tot**	**CE**	**ESE**	**Tot**	**GT**
UC20B101	Environmental Science and Disaster Management	2	-	-	2	3	30	05	05	10	50	100	-	-	-	100
UC20B102	Communication Skills	2	-	-	2	3	30	05	05	10	30	100	-	-	-	100
LT21B121	Front End Web Development	3	-	2	4	3	30	05	05	10	50	100	20	30	50	150
LT21B122	Programming Foundation	3	-	2	4	3	30	05	05	10	50	100	20	30	50	150
LT21B123	UI Frameworks	3	-	2	4	3	30	05	05	10	50	100	20	30	50	150
LT21B124	Web Development Foundations	3	-	2	4	3	30	05	05	10	30	100	20	30	50	150
MA20B103	Engineering Maths-I	4	-	-	4	3	30	05	05	10	30	100				100
PB20B101	Project Based Learning-I	-	-	8	4	2	-						50^	50	100	100
		Total			**28**											**1000**

L-Lecture, T-Tutorial, P-Practical, MSE- Mid Semester Exam, ASG- Assignment, TA- Teacher's Assessment, ATTD-Attendance, CE-Continuous Evaluation , ESE-End Semester Exam, Tot-Total, GT-Grand Total, ^- 02 assessment by panel of Experts

Second Semester																
Course Code	**Course Title**	**Contact Hours per Week**			**Credits**	**ESE Duration**	**Theory**						**Practical**			
		L	**T**	**P**			**MSE**	**ASG**	**TA**	**ATTD**	**ESE**	**Tot**	**CE**	**ESE**	**Tot**	**GT**
UC20B202	Entrepreneurship Development	2	-	-	2	3	30	05	05	10	50	100	-	-	-	100
LT21B221	Application Development and Process	2	-	4	4	3	30	05	05	10	50	100	20	30	50	150
LT21B222	Web Development using Platforms	2	-	4	4	3	30	05	05	10	50	100	20	30	50	150
LT21B223	Develop Enterprise Applications	2	-	4	4	3	30	05	05	10	50	100	20	30	50	150
LT21B224	Application Integration	2	-	4	4	3	30	05	05	10	30	100	20	30	50	150
MA20B204	Engineering Maths-II	4	-	-	4	3	30	05	05	10	30	100				100
PB20B201	Project Based Learning-II	-	-	8	4	2	-						50^	50	100	100
		Total			**26**											**900**

L-Lecture, T-Tutorial, P-Practical, MSE- Mid Semester Exam, ASG- Assignment, TA- Teacher's Assessment, ATTD-Attendance, CE-Continuous Evaluation , ESE-End Semester Exam, Tot-Total, GT-Grand Total, ^- 02 assessment by panel of Experts

Third Semester																
Course Code	**Course Title**	**Contact Hours per Week**			**Credits**	**ESE Duration**	**Theory**						**Practical**			
		L	**T**	**P**			**MSE**	**ASG**	**TA**	**ATTD**	**ESE**	**Tot**	**CE**	**ESE**	**Tot**	**GT**
UC20B302	Quantitative Aptitude-I	2	-	-	2	3	30	05	05	10	50	100	-	-	-	100
LT21B321	IT systems & Networks	2	-	4	4	3	30	05	05	10	50	100	20	30	50	150
LT21B322	IT Security	2	-	4	4	3	30	05	05	10	30	100	20	30	50	150
LT21B323	Application Implementation	2	-	4	4	3	30	05	05	10	30	100	20	30	50	150
LT21B324	Data Science Essentials	2	-	4	4	3	30	05	05	10	30	100	20	30	50	150
CS20B302	Data Structures	3	-	2	4	3	30	05	05	10	30	100	20	30	50	150
PB20B301	Project Based Learning-III	-	-	8	4	2	-						50^	50	100	100
		Total			**26**											**950**

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Fourth Semester																
Course Code	**Course Title**	**Contact Hours per Week**			**Credits**	**ESE Duration**	**Theory**						**Practical**			
		L	**T**	**P**			**MSE**	**ASG**	**TA**	**ATTD**	**ESE**	**Tot**	**CE**	**ESE**	**Tot**	**GT**
UC20B402	Quantitative Aptitude-II	2	-	-	2	3	30	05	05	10	50	100	-	-	-	100
LT21B421	Python Programming for AI	2	-	4	4	3	30	05	05	10	50	100	20	30	50	150
LT21B422	Database Design & Implementation	2	-	4	4	3	30	05	05	10	30	100	20	30	50	150
LT21B423	Machine Learning	2	-	4	4	3	30	05	05	10	30	100	20	30	50	150
CS20B401	Object Oriented Analysis and Design	3	-	2	4	3	30	05	05	10	30	100	20	30	50	150
PB20B401	Project Based Learning-IV	-	-	8	4	2	-						50^	50	100	100
		Total			**22**											**800**

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Fifth Semester															
Course Code	**Course Title**	**Contact Hours per Week**			**Credits**	**ESE Duration**	**Theory**						**Practical**			
		L	**T**	**P**			**MSE**	**ASG**	**TA**	**ATTD**	**ESE**	**Tot**	**CE**	**ESE**	**Tot**	**GT**
UC20B501	Introduction to Management and Leadership	2	-	-	2	3	30	05	05	10	50	100	-	-	-	100
LT21B521	Deep Learning	3	-	2	4	3	30	05	05	10	50	100	20	30	50	150
CS20B504	Analysis and Design of Algorithm	3	-	2	4	3	30	05	05	10	50	100	20	30	50	150
LT21B522	Capstone Project-I	-	-	20	10	2	-						100^	150	250	250
PB20B501	Project Based Learning-V	-	-	8	4	2	-						50^	50	100	100
		Total			**24**											**750**

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Sixth Semester																
Course Code	**Course Title**	**Contact Hours per Week**			**Credits**	**ESE Duration**	**Theory**						**Practical**			
		L	**T**	**P**			**MSE**	**ASG**	**TA**	**ATTD**	**ESE**	**Tot**	**CE**	**ESE**	**Tot**	**GT**
UC20B601	Social and Professional Ethics	3	-	-	2	3	30	05	05	10	50	100	-	-	-	100
LT21B621	Reinforcement Learning	3	-	2	4	-3	30	05	05	10	50	100	20	30	50	150
CS20B602	Software Engineering	3	-	2	4	-3	30	05	05	10	50	100	20	30	50	150
LT20B622	Capstone Project II	-	-	20	10	2	-						100^	150	250	250
		Total			**20**											**650**

L-Lecture, T-Tutorial, P-Practical, MSE- Mid Semester Exam, ASG- Assignment, TA- Teacher's Assessment, ATTD-Attendance, CE-Continuous Evaluation , ESE-End Semester Exam, Tot-Total, GT-Grand Total, ^- 02 assessment by panel of Experts

Seventh Semester																
Course Code		**Contact Hours per Week**			**Credits**	**ESE Duration**	**Theory**						**Practical**			
		L	**T**	**P**			**MSE**	**ASG**	**TA**	**ATTD**	**ESE**	**Tot**	**CE**	**ESE**	**Tot**	**GT**
	MOOC-I	-	-	8	4	3	05	05	10	50	50	100	-	-	-	100
	MOOC-II	-	-	8	4	3	05	05	10	50	50	100	-	-	-	100
LT21B722	Capstone Project III	-	-	24	12	2	-						150^	150	300	300
LT21B723	Summer Internship Project			8	4	2	-						50^	50	100	100
		Total			**24**											**600**

L-Lecture, T-Tutorial, P-Practical, MSE- Mid Semester Exam, ASG- Assignment, TA- Teacher's Assessment, ATTD-Attendance, CE-Continuous Evaluation , ESE-End Semester Exam, Tot-Total, GT-Grand Total, ^- 02 assessment by panel of Experts

Eighth Semester																
Course Code	**Course Title**	**Contact Hours per Week**			**Credits**	**ESE Duration**	**Theory**						**Practical**			
		L	**T**	**P**			**MSE**	**ASG**	**TA**	**ATTD**	**ESE**	**Tot**	**CE**	**ESE**	**Tot**	**GT**
LT21B821	Industrial Training	-	-	40	20	2	-						200^	300	500	500
		Total			**20**											**600**

L-Lecture, T-Tutorial, P-Practical, MSE- Mid Semester Exam, ASG- Assignment, TA- Teacher's Assessment, ATTD-Attendance, CE-Continuous Evaluation , ESE-End Semester Exam, Tot-Total, GT-Grand Total, ^- 02 assessment by panel of Experts

SANJEEV AGRAWAL GLOBAL EDUCATIONAL (SAGE) UNIVERSITY, BHOPAL

Syllabus

for

BTech CSE (Hons)-Data Science

I- Semester

School of Advanced Computing

COURSE CODE	ENVIRONMENT STUDIES & DISASTER MANAGEMENT	TOTAL LECTURE:30
UC20B101		(LTP=2-0-0=2)

Course Objectives:

- Understand the natural environment and its relationships with human activities.
- Characterize and analyze human impacts on the environment.
- Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.
- Capacity to integrate knowledge and to analyses, evaluate and manage the different public health aspects of disaster events at a local and global levels.
- Capacity to obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios .

UNIT	CONTENTS	HOURS
I	**Introduction to Environment:** Definition, Components of Environment, Relationship between different components, Man- Environment relationship, Impact of Technology on the environment, Environmental Degradation, Sustainable Development, Environmental Education.	5
II	**Ecology & Ecosystems:** Introduction: Ecology- Objectives and Classification, Concepts of an ecosystem- structure & function of ecosystem, Components of ecosystem- Producers, Consumers, Decomposers, Energy flow in the ecosystem - Ecological succession, Food chains, food webs and ecological pyramids, Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems and its types, Bio- Geo- Chemical Cycles - Hydrological Cycle, Carbon cycle, Oxygen Cycle, Nitrogen Cycle, Sulfur Cycle.	7
III	**Environmental Pollution:** Composition of air, Structure of atmosphere, Ambient Air Quality Standards, Classification of air pollutants, Sources of common air pollutants like SPM, SO2, NOX , Natural & Anthropogenic Sources, Effects of common air pollutants, Air Pollution Episodes, Sound and Noise measurements, Sources of Noise Pollution, Ambient noise levels, Effects of noise pollution, Noise pollution control measures, Water Quality Standards, Sources of Water Pollution, Classification of water pollutants, Effects of water pollutants, Eutrophication, Water Pollution Episodes, Global Warming and Green Houses Effect, Acid Rain, Depletion of Ozone Layer.	7
IV	**Energy Resources:** Renewable & Nonrenewable Resources: Renewable Resources, Nonrenewable Resources, Indian Scenario, Conventional Energy Sources & its problems, non-conventional energy sources- Advantages and its Limitations	4

V	**Disaster Management:** Natural Disasters and its types, Accidental Disasters, Impact of Disasters on Trade and International Trade, Introduction, Natural disasters , Earthquakes, Hurricanes, Tornadoes, Floods, Drought, Tsunami, Volcanoes, Cyclones and Storms, Forest Fires, Severe Heat Waves, Landslides and Avalanches, Epidemics and Insect Infestations, Technological and Social Disasters Types of Technological Hazards, Social Disasters, Political and Crowd Disasters, War and Terrorism, Components of Disaster Management, Government's Role in Disaster Management through Control of Information, Actors in Disaster Management, Organizing Relief measures at National and Local Level, Psychological Issues, Carrying Out Rehabilitation Work, Government Response in Disaster	**7**

Course Outcome as per Bloom's Taxonomy	
At the end of the course the students will be able to:	
CO1	**Understand**[2] the importance of Environment.
CO2	**Understand**[2] the knowledge of Ecology & Ecosystems.
CO3	**Analyze**[3] to impart basic knowledge about Environment Pollution & theirs Remedies.
CO4	**Understand**[2] about Energy Resources.
CO5	**Understand**[2] about Disaster Management.
Text Books	• Dr. N. S. Varandani.(2013). "*Basics of Environmental Studies*", Books India Publications, • Mukesh Dhunna.(2011)."*Disaster Management"*, Vayu Education of India, Delhi Publication, • Benny Joseph.(2017).."*Environmental Studies* " , McGraw Hills Education,
Reference Books	• R. Rajagopalan .(2015)."*Environmental Studies"* , Oxford University, Press Publication, • Richard T Wright & Bernard J Nebel .(2002),"*Environmental Science"*, Prentice Hall India Publication, • Daniel B. Botkin & Edward A Keller .(2014)"*Environmental Science"*, Wiley Publications,

COURSE CODE	COMMUNICATION SKILLS	TOTAL LECTURE:30
UC20B102	(LTP=2-0-0=2)	

Course Objectives :

The course provides good introduction and understanding about the following:

- The concept and understanding of different types of Communication
- Introduce different tools of communication that are useful in various techniques of problems solving.
- The Grammatical knowledge of Language Learning with the enhancement of word power.
- To introduce the tricks and methods of official and Technical writing.

UNIT	CONTENTS	HOURS
I.	Introduction: Theory of Communication, Types and modes of Communication, Effective Communication, Barriers and Strategies	**6**
II.	Language of Communication: Verbal and Non-verbal (Spoken and Written), Personal, Social and Business Communication, Intra-personal, Inter-personal, Group communication	**6**
III.	Speaking Skills Dialogue, Group Discussion Interview, Public Speech, Role Play/Extempore Presentations	**6**
IV.	Reading and Understanding Close Reading, Comprehension, Analysis and Interpretation, Report Writing, Paraphrasing and Summary	**6**
V.	Writing Skills Making notes Documenting Report Writing, Writing Letters - job applications, CV and Resume Academic Writing, Writing a Proposal	**6**

Course Outcome as per Bloom's Taxonomy

At the end of the course the students will be able to:

CO 1	**Apply**[3] correct usage of English grammar in writing and speaking.
CO 2	**Analyze**[4] and improve their speaking ability in English both in terms of fluency and comprehensibility.
CO 3	**Evaluate**[5] themselves by giving oral presentations and will receive feedback on their performances.
CO 4	**Develop**[3] their reading speed and comprehension of academic articles
CO 5	**Compare**[5] their reading fluency skills.

Text Books	• University Of Delhi ,Department Of English (2006) *"Fluency in English - Part II"*, Oxford University Press, • Delhi University (2008) *"Business English"*, Pearson, • Kumar S. P. (2013) *"Language, Literature and Creativity"*, Orient Blackswan,
Reference Books	• John E , Warriner, (1973)."*Warriner's English Grammar and Composition: Complete Course* ",Harcourt, Brace, Jovanovich, • *"Literary/Knowledge Texts (Poetry comprehension" – Our Casuarina* Tree by Prose Comprehension – An Astrologer's Day by R.K

COURSE CODE	FRONT END WEB DEVELOPMENT	TOTAL LECTURE:30 PRACTICAL: 30
LT21B121		(LTP=2-0-4=4)

Course Objectives:

- Explain website design concepts and the methodology behind designing, implementing, and testing interactive websites.
- Identify the purpose of mark-up languages and its applications in structuring a page.
- Describe the purpose of styling and its application in styling the page.
- Describe the purpose of scripting and its application in developing an interactive website
- Develop a Single Page Application using HTML5, CSS3, JavaScript/jQuery and AJAX.

UNIT	CONTENTS	HOURS
I	**Introduction to Web Technologies:** Server, Server Component, Web Server, HTTP, DNS, Website builders, CMS, Hosted and Non-Hosted CMS, Limitations of hosted CMS, Front End Design, Server-side Scripting, Publishing Website, Purchase domains and hosting, Setup domain and hosting, FTP/STP, WordPress, Web Development Process, Content Strategy, Persona, Information Architecture, Wireframe, User flow design, Storyboard	**6**
II	**HTML:** Importance of HTML, Basic HTML Syntax, Code Editor, HTML resources, Exploring HTML Document, Doctype Declarations, Document Head and Body, Understanding Content Models, Formatting content with HTML, Formatting Paragraphs, Controlling Line Breaks, Emphasizing Text, Displaying Special Characters, Controlling Whitespace, Displaying Image, NAV Element, Article Element, Section Element, Aside Element, Div Element, Semantic Elements, WAI-ARIA Roles, Internal and External linking, Types of lists – Ordered List, Unordered List, and Definition List,	**6**
III	**CSS:** Inline, Internal & External CSS, Syntax, terminology and naming conventions, Simple selectors, Pseudo class selectors, RGB, HEX, and Keyword color values, Cascading, inheritance, and specificity, Typography, Layouts	**6**
IV	**JavaScript and jQuery:** Web Browsers for Learning JavaScript, Declaring and assigning variable, Numbers, Strings, Booleans and the quest for truth, Manipulation Objects, Objects and References, Arrays, Manipulating Arrays, Readability Comments, Regular expressions, Simple comparisons, Arithmetic operators, Logical operators, Conditionals: if and switch, ternary operators, Type checking, Flow: Sequential, Iterative and Enumerative, Functions, Understanding variable scope, jQuery: Selectors, Filters, Creating and	**6**

	modifying Page Content, Handling Events, Animating page content, Working with AJAX, jQuery UI: Spinner, Slider, Accordion, Menu, Tabs	
V	**Single Page Application and Testing:** Introduction to Ajax, Rich Internet Application, Benefits and Drawbacks, Business Process and Workflow, Ajax: Technical Components, Operations, XMLHttpRequest, XMLHttpResponse, JSON, XML, AJAX-Server Communication with JSON, W3 Standards, W3C Technology Stack, Testing, Types of Testing, Cross Browser Testing, HTML, CSS Validator, Fiddler	**6**

Course Outcomes as per Bloom's Taxonomy	
CO1	Understand mark-up, styling, and scripting languages and its applications to develop the web applications
CO2	Develop the user flow using Information Architecture, Wireframe, and storyboard based on the requirements.
CO3	Design the User Interface according to the business requirements
CO4	Construct Single Page Web Application using HTML, CSS, JavaScript, jQuery, jQueryUI, and Ajax
CO5	Evaluate the user interface to meet the business requirements and browser compatibility
Text Book	• Jon Duckett, 2014. Web Design with HTML, CSS, JavaScript, and jQuery Set, 1st ed. John Wiley & Sons, Inc. • Powell, T. A., 2008. Ajax: The Complete Reference. 1st ed. s.l.:McGraw-Hill.
Reference Books	• Wiley Brown, E., 2016. Learning JavaScript add sparkle and life to your web pages. 3rd ed. CA: O'Reilly Media, Inc.,. • Hogan, B. P., 2013. HTML5 and CSS3, Level Up with Today's Web Technologies. 2nd ed. USA: The Pragmatic Programmers, LLC.. • Frank W. Zammetti., 2007, Practical JavaScript, DOM Scripting, and Ajax Projects, Apress

COURSE CODE	PROGRAMMING FOUNDATIONS	TOTAL LECTURE:30 PRACTICAL: 30
LT21B122		(LTP=2-0-4=4)

Course Objectives:

- Describe the attributes of different programming paradigms
- Explain the application design process and different algorithm types
- Identifying opportunities to write modularized code using Java and Java Class Libraries with documentation.
- Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
- Recognize Syntax, Logical, and Runtime errors and its rectification techniques

UNIT	CONTENTS	HOURS
I	**Introduction to Programming:** Program Paradigm: Procedural, Event, Functional, and Object-Oriented Programming, Algorithms, Flowcharts, Pseudo code, Formal Specification Method, Event Driven, Data Driven, Finite State Machines, Application design process.	6
II	**Java Basics – Part 1:** Anatomy of Java Program, Comments, Data type, Comments, Strings, Patterns, Arithmetic operators, Relational Operators, Logical operators, Conditionals: if and switch, ternary operators, Type checking, Flow: Sequential, Iterative and Enumerative, Functions, Understanding variable scope, Methods, Parameters, Arrays, Array List, Error Handling: Exception, Custom Exceptions, and try … catch	6
III	**Java Basics – Part 2:** Data Flow: Sequential, Iterative and Enumerative, Functions, Understanding variable scope, Methods, Parameters, Arrays, Array List, Error Handling: Exception, Custom Exceptions, and try … catch	6
IV	**Object Oriented Programming:** Anatomy of Object, Object Oriented Programming Principles Encapsulation, Abstraction, Inheritance, and Polymorphisms, Method overloading, Method overriding, Attributes, Types of variables instance, static, and final,	6
V	**Java Documentation and Unit Testing:** Naming Conventions, Documenter block, JavaDoc, Junit Architecture, Junit Platform, Assertions, Tagging and Filtering Tests, Conditional Testing, Nested and Repeated Tests, Dynamic Tests, Test Interfaces	6

Course Outcomes as per Bloom's Taxonomy	
CO1	Explain the problem solving, Programming Basics, OOP principles and Software Design Techniques
CO2	Analyze user requirements, and document the specifications of the application
CO3	Construct Command line application using Java
CO4	Create API documentation using JavaDoc
CO5	Evaluate the software design using Junit framework
Text Book	Harry.H.Chaudhary, 2014. Introduction to Java Programming. 2nd ed. s.l.:Programmers Mind || Createspace Inc. OD Publishing, LLC USA.. Shekhar Gulati, R. S., 2017. Java Unit Testing With JUnit 5. s.l.:Apress.
Reference Books	• Nair, P. S., 2009. Java Programming Fundamentals- Problem Solving Through Object Oriented Analysis and Design. 1st ed. Boca Raton: CRC Press, Taylor & Francis Group. • Weiss, M. A., 2010. Data Structures & Problem-Solving Using Java. 4 ed. s.l.:Pearson Education, Inc..

COURSE CODE	UI FRAMEWORKS	TOTAL LECTURE:30 PRACTICAL: 30
LT21B123		(LTP=2-0-4=4)

Course Objectives:

- Describe the techniques for gathering and analysing user feedback
- Classify the types of prototyping and techniques to develop the human-centric prototyping
- Use Bootstrap to construct responsive website
- Develop Components using TypeScript, Templates, and Decorators and device-independent Single Page Application
- Identify performance levels and gaps between current level of user experience and the desired user experience

UNIT	CONTENTS	HOURS
I	**Introduction to UI/UX Design:** Ideation, Analyzing User Data, Creating Persona, Understanding Ideation, Scenarios and Storyboards, Get Data to Analyze, Turn Observations into Actionable Data, Observer Users, Observation Techniques, User experience metrics: Task Success Rate, Error Rate, Time Taken to Complete, and Net Promote Score , Usability Testing, Right participants, Test plan, Participants questions, Analyze with the team, Report, Resetting, Measure UX Metrics, and Impact	6
II	**Prototyping:** Prototyping: Low fidelity, Medium fidelity, and High fidelity, Testing and Evaluating Prototypes, Paper Prototype, mockups, Keynote, Axure: Interactive Button, Hiding and Showing Widgets, Passing values to Next Page, Anchor Links, Embedding Media, Imaging Banner, Navigation Menu, Tooltips, Account Login, Required Fields	6
III	**Responsive Framework:** Essential Classes: Containers, Colors, Spacing, Display, Position, Using Elements, Typography styles, Typography elements, Backquotes and simple lists, List Groups, Tables, Images and figures, Borders, Modifying Elements, Box modifications, Sizes and ratios, Interactivity classes: Layouts with Columns and Flexbox, Basic grid layout, Rows, Responsive columns, Flexbaox metrics, Flexbox content, Flexbox organization, Layout Components, Buttons, Navs, Navbar, Cards, Pagination, Progress, Spinner, Badges and breadcrumbs, Interactive Components: Carousel, Accordions, Alerts, Toasts, Model, Collapse, Dropdowns, Tooltips, Popovers, Scrollspy	6

	Form: Basic inputs, Selects and range, Floating labels, Checks and radios, Input groups	
IV	**Angular Framework - Basics:** Architecture, Directives: Structural, Built-in, and Custom, Pipes Built-in and Custom, Data Binding, Dependency Injection, Services, Data Persistence, Routing, NgModule, Root Module, Component, Property binding, Event binding, Forms: Template Driven	**6**
V	**Angular Framework - Advanced:** Model Driven, Validation, Error Handling, Providing Services, Service in components, HttpClient, mock backend, POST, PUT and DELETE calls, Handling HTTP errors Routing Outlets and Router links	**6**

Course Outcomes as per Bloom's Taxonomy	
CO1	Illustrate the techniques to gather user requirements and analyze the user feedback
CO2	Design and develop the prototype by adopting user experience principles
CO3	Demonstrate observation of the users through usability test while revising the prototype
CO4	Develop Responsive Website using Bootstrap framework
CO5	Develop a Single Page Application using Angular framework
Text Book	• Seshadri, S., 2018. Angular Up & Running, Learning Angular Step By Step. 1st ed. s.l.:O'REILLY. • Stull, E., 2018. UX Fundamentals for Non-UX Professionals: User Experience Principlesfor Managers, Writers, Designers, and Developers. 1st ed. s.l.:Apress. • Rahman, b. S. F., 2014. Jump Start Bootstrap. 1st ed. VIC, Australia: SitePoint Pty Ltd.
Reference Books	• Axure, n.d. Axure Video Courses. [Online] ○ Available at: https://www.axure.com/support/video-courses • Radfors, S., 2015. Learning web Development with Bootstrap and AngularJS. 1st ed. Birmingham: Packt Publishing Ltd..

COURSE CODE	WEB DEVELOPMENT FOUNDATIONS	TOTAL LECTURE: 30 PRACTICAL: 30
LT21B124		(LTP=2-0-4=4)

Course Objectives:

- Gain an understanding of the Model, View, and Controller (MVC) framework.
- Get in-depth knowledge of the syntax and structures of the framework and their respective Application Programming Interfaces (API).
- Recognize how to analyze and verify the technical design of a business solution.
- Implement the architectures, protocols, and standards required to integrate the client and server components.
- Evaluate trade-offs in software development practices to recommend the areas for improvement.

UNIT	CONTENTS	HOURS
I	**Introduction to SDLC & Technical Design:** SDLC, Phases in SDLC: Requirements gathering, Analysis and Design, Implementation, Testing, Deployment, and Maintenance, System Requirements Specifications, UML: Use Case, Activity, Sequence, Class Diagram, Technical Design	6
II	**Introduction to JSP and Servlets:** Purpose of the servlets, HTTP Request, GET Request in Web App, Connecting with DB, Querying DB, Building Servlet response, POST Requests, Collect Data from forms, Call DAO to process, Forwarding and redirecting requests, Configure servlet, Servlet Context, Parameters vs Attributes, Servlet Lifecycle, Request Dispatcher, JSP Lifecycle, JSP Elements: Scriplet, Expression, Declaration, Implicit Objects of JSP, Query String, Session Management, Cookies,	6
III	**Introduction to Spring MVC:** Spring framework overview: Inversion of Control (IoC), Dependency Injection (DI), Modules: Core (DI, Internationalization Events, Validation, Aspect Oriented Programming (AOP), Data Access (DAO, ORM, JDBC), Web – Servlet API (Spring MVC), Reactive API (Spring WebFlux), Web Sockets, Integration – Java Message Service (JMS), Java Management Extension (JMX), and Remote Method Invocation (RMI), Testing, Components of Web App – Presentation Layer, Web Layer, Application Layer, Data Access Layer, Database Server, MVC Pattern, Configuring Meta Data, Annotation based meta data, Instantiating a bean, Bean Properties, Bean Scope, Callbacks	6
IV	**Spring CRUD:**	6

COURSE CODE	PROJECT BASED LEARNING-I	Total Lecture: 30 Practical: 30
PB20B101		(LTP=0-0-4=2)

Course Objectives:

- Integrating the knowledge and skills of various courses on the basis of multidisciplinary projects
- Develop the skill of critical thinking and evaluation.
- To develop 21st century success skills such as critical thinking, problem solving, communication, collaboration and creativity/innovation among the students.
- To enhance deep understanding of academic, personal and social development in students.
- Employ the specialized vocabularies and methodologies.

Course Outcome as per Bloom's Taxonomy	
At the end of the course the students will be able to:	
CO 1	**Apply**[3] a sound knowledge/skills to select and develop their topicand project respectively.
CO 2	**Develop**[6] plans and allocate roles with clear lines of responsibilityand accountability.
CO 3	**Design**[6] solutions to complex problems following a systematicapproach like problem identification, formulation and solution.
CO 4	**Collaborate**[6] with professionals and the community at large inwritten and in oral forms
CO 5	**Correlate**[4] the knowledge, skills and attitudes of a professional.
General Guidelines:	• PBL will be an integral part of UG/PG Programs at different levels. • Each semester offering PBL will provide a separate Course Code, two credits will be allotted to it. • Faculty will be assigned as mentor to a group of 30 students minimum byHoS. • Faculty mentor will have 4 hours/week to conduct PBL for assigned students. • Student will select a topic of their choice from syllabus of any course offered in respective semester (in-lines with sustainable development goals): • Student may work as a team maximum 3 or minimum 2 members for single topic. • For MSE, student's performance will be assessed by panel of three experts either from other department/school, or from samedepartment/school based on chosen topic. This will be comprised of apresentation by student followed by viva-voce. It will be evaluated for 30 marks. • 20 marks would be allotted for continuous performance assessment by concerned guide/mentor. For ESE, student will need to submit a project report in prescribed format, duly signed by concerned guide/mentor and head of the school. The report should be comprised of following components: 1. Introduction 2. Review of literature 3. Methodology 4. Result and Discussion 5. Conclusion and Project Outcomes 6. References

	• Student will need to submit three copies for 1. Concerned School 2. Central Library 3. Self • The integrity of the report should be maintained by student. Any malpractice will not be entertained. • Writing Ethics to be followed by student**,** a limit of 10 % plagiarism is permissible. Plagiarism report is to be attached along with the report. • Project could be a case study/ analytical work /field work/ experimental work/ programming or as per the suitability of the program.

SANJEEV AGRAWAL GLOBAL EDUCATIONAL (SAGE) UNIVERSITY, BHOPAL

Syllabus

for

BTech CSE (Hons)-Data Science

II- Semester

School of Advanced Computing

COURSE CODE	ENTREPRENEURSHIP DEVELOPMENT	TOTAL LECTURE:30
UC20B202		(LTP=2-0-0=2)

Course Objectives :

Develop understanding and confidence in students to venture into entrepreneurship by giving them baseline understanding of the various aspects impacting decision making on various frontiers as faced by an enterprise

UNIT	CONTENTS	HOURS
I.	Introduction: Entrepreneur – meaning, evolution, importance, qualities, nature, types, traits. Entrepreneurship development - its importance, role of Entrepreneurship. Entrepreneurial environment, culture and stages in entrepreneurial process, changing dimensions in entrepreneurship – Digital entrepreneurship. Entrepreneur Vs. Intrapreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager; Role of Entrepreneur in Indian economy and developing economies with reference to Self-Employment Development Entrepreneurial Culture.	7
II.	Starting A New Venture: Generating business idea – sources of new ideas, methods of generating ideas, opportunity recognition. Choice of the organization : Sole Proprietorship, partnerships, Joint Stock Co., Co-Operatives Family Business – meaning, characteristics, importance, types and models. Growing and evolving family business – Complexity of family enterprise – Diversity of successions; Different Dreams and challenges. Feasibility study – market feasibility, technical/operational feasibility, financial feasibility, environmental scanning, competitor and industry analysis. Drawing business plan - preparing project report, presenting business plan to investors.	7
III.	Financing and Managing New Venture: Financing and Managing the new venture, Source of capital, Record Keeping, financial controls, Marketing and sales control. Internet advertising Features and evaluation of joint ventures. Basic Government Procedures to be complied with; Policies governing SMEs – Steps in setting up a small unit. Type of business- Large Scale/ MSME; Judging Funding requirements of the business; New Generation Funding sources- Venture Capital Funding, SME Funding, Angel Investors etc.	5
IV.	Institutional support and government initiatives for Entrepreneurs': Role of Directorate of Industries, Role of following agencies in the Entrepreneurship Development - District Industries Centers (DIC), Industrial Development Corporation (IDC), State Financial Corporations (IFCs), Commercial Banks, Small Scale Industries Development Corporations (SSIDCs), Khhadi and Village Industries Commission (KVIC), Industries Service Institute (SISI), NABARD, National Small Industries corporation	6

	(NSIC), Small Industries Development, Bank of India (SIDBI) and other relevant institutions / organizations. Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants.	
V.	New Venture Expansion and Exit Strategies: Joint Ventures, Acquisitions, mergers, franchising, public issues, right issues, bonus issues and stock issues. Exit Strategies, Reasons for exiting and long and short term preparation, CSR, Dimensions of CSR	**5**

Course Outcome as per Bloom's Taxonomy

At the end of the course the students will be able to:

CO 1	**Develop**[3] managerial qualities and competencies of an entrepreneur.
CO 2	**Acquaint**[2] himself with the challenges of starting a new venture and the process of setting up a business.
CO 3	**Build**[3] essential skills and creativity needed to build teams and work in and with them.
CO 4	**Know**[1] the essential procedure and funding avenues for setting up a new business.
CO 5	**Learn**[1] the various government initiatives and accordingly plan for his business.
Text Books	• Dr. G.K. Varshainey *,(2019)."Fundamental of Entrepreneurship* ", Sahitya Bhawan Publications, • Dr. A.N Bharti, Dr. Pramodh Kumar Tripathi.(2021-22). *"Fundamental of Entrepreneurship*" , Rajeev Sahitya Bhawan Publication, SBPD Publication • H. Nandan*.(2013)."Fundamental of Entrepreneurship* ", Third Edition, PHI Learning. • K. Nagarajan.(2017)*.,"Project Management* ",Second Edition, New Age International,
Reference Books	• Hisrich Peters.(2017). *"Entrepreneurship* ",Tenth Edition ,Mc Graw Hills, • Brigitte Berger.*(* 1991*)"The Culture of Entrepreneurship* ", ICS Pt., • Steven Brandt .(1997)." Entrepreneuring: 10 Commandments for Building a Growth Company (Build Your Business Guides).3rd Ed. Archipelago Pub; • Gurmit Narula *.(2002)"The Entrepreneurial Connection* ", Tata McGraw Hills.

COURSE CODE	APPLICATION DEVELOPMENT & PROCESS	TOTAL LECTURE: 30 PRACTICAL: 30
LT21B221		(LTP=2-0-4=4)

Course Objectives:

- Prepare a project plan to manage a small to a medium-scale web application.
- Plan to develop reusable components and Design reusable User Interface templates and components
- Develop applications in alignment with design specifications using a range of tools and techniques, by adopting the security standards and features for the application
- Conduct Quality Assurance testing by using identified software security and testing techniques
- Deploy the application build in a virtual machine after evaluating the test results against desired performance, standards, and usability outcomes.

UNIT	CONTENTS	HOURS
I	**Spring MVC**: Spring framework overview: Inversion of Control (IoC), Dependency Injection (DI), Modules: Core (DI, Internationalization Events, Validation, Aspect Oriented Programming (AOP), Data Access (DAO, ORM, JDBC), Web – Servlet API (Spring MVC), Web Sockets, Integration – Java Message Service (JMS), Java Management Extension (JMX), and Remote Method Invocation (RMI), Testing, Components of Web App – Presentation Layer, Web Layer, Application Layer, Data Access Layer, Database Server, MVC Pattern, Configuring Meta Data, Annotation based meta data, Instantiating a bean, Bean Properties, Bean Scope, Callbacks	**3**
II	**Spring Boot:** Introduction to Spring Boot Features, Value Proposition of Spring Boot, Creating a simple Boot application using Spring Initializr website, Spring Boot Dependencies, Auto-configuration, and Runtime, Dependency management using Spring Boot starters, Configuration properties, Overriding auto-configuration , Using CommandLineRunner	**9**
III	**Spring Data:** Spring data commons, ORM, Logical model vs physical model, Java Persistence API, Map a database table to a Java Class, Multiple tables to Java Classes, Java Persistence Query Language, Spring Data Repositories interfaces, CRUDRepository Interface, JPA Repository, Paging and Sorting, @Query methods, Optional query response, Spring Data REST, QueryDSL, Auditing	**6**
IV	**Integrating Angular with Spring:** Configure API using Spring Java Config, Resource Modeling, EndPoint – GET, POST, PUT, and DELETE endpoint using Spring MVC, Create	**6**

	Angular components, Configure JPA Layer, JPA Repository, REST API POST Request	
V	**Spring Security and Testing:** Spring Boot testing overview, Integration testing using @SpringBootTest, Web slice testing with MockMvc framework, Slices to test different layers of the application	**6**

Course Outcomes as per Bloom's Taxonomy	
CO1	Formulate business requirements into a functional and technical specification document.
CO2	Manage the application development process as per the project management plan
CO3	Construct software components/applications to meet the business requirement.
CO4	Evaluate the application to meet the desired performance, standards, and usability outcomes as per the specifications
CO5	Identify the suitable hosting environment to deploy the application
Text Book	• Available at: https://docs.spring.io/spring-framework/docs/current/javadoc-api/[Accessed 28 April 2020]. • Bretet, A., 2016. Spring MVC Cookbook. 1st ed. Birmingham: Packt PublishingLtd.. • WALLS, C., 2016. Spring Boot in Action. 1st ed. Shelter Island: Manning Publications Co. .
Reference Books	• Kayal, D., 2008. Pro Java™ EE Spring. 1st ed. s.l.:Apress. • Sarcar, V., 2019. Java Design Patterns: A Hands-On Experience with Real-World Examples. 1st ed. s.l.:Apress. • Ganeshan, A., 2016. Spring MVC Beginner's Guide. 2nd ed. s.l.:Packt Publishing.

COURSE CODE	WEB DEVELOPMENT USING PLATFORMS	TOTAL LECTURE: 30 PRACTICAL: 30
LT21B222		(LTP=2-0-4=4)

Course Objectives:

- Identify the technical and functional requirements of stakeholders' meeting their business needs
- Prepare a functional specification and technical blueprint for developing enterprise applications
- Develop an architectural proof of concept by adopting appropriate permissions and authorizations available in the platforms
- Develop a solution architecture using the Liferay portal by developing the content, portlets, and backend using Liferay SDK/ IDE Plugins
- Demonstrate how the recommended architecture address the business needs

UNIT	CONTENTS	HOURS
I	**Java Design Patterns:** Creational – Singleton, Factory, Builder, Prototype, and Abstract, Structural – Adapter, Bridge, Composite, Decorator, Façade, Flyweight, and Proxy, Behavioural - Observer, Chain of responsibility, Command, Interpreter, Iterator, Mediator, Memento, Null Object, Strategy, Template, and Visitor, Advantages and Disadvantages	6
II	**Introduction to Liferay and Administration:** Installation of Liferay, access portal using Tomcat server, Configure in Eclipse, Portlet, Advantage and disadvantages of Java Portlet, Configure Liferay plugin, SDK, Create, Build, and Run the project, Managing User accounts, Controlling User access, Building sites, Adding and Managing pages	6
III	**Backend Development & Content Creation:** Sites, Out of the box portlets, Journal Article, Message Board, Blogs, Aggregating blog entries, Blogs Administration Portlet, Document and Media Library, Reusable templates, Automate and optimize content publication, Staging content, Advanced publication with staging, Updating theme, Page Personalization and customizations, Deploy Liferay IDE components, Creating Liferay MVC Portlet, Build the portlet and deploy	6
IV	**Developing a simple application:** Service builder, Presentation Layer, UI Widgets and Templates, Themes, Logo, Implementing Access Control, Application Configuration and Implementation, Configure Service, Configuration - Create custom tables,	6

	Global Service information, Service Entities, Defining Attributes, custom exceptions, Build services, Build and deploy the project	
V	**Assets Management, Permissions and Authorizations:** Overview of Assets Management framework, Controlling access to assets, Connecting with existing repositories, Making custom portlet registered as a Liferay Asset, Using search and indexing, Implement permission checker on custom portlet, Workflow Design in Kaleo definition,	**6**

Course Outcomes as per Bloom's Taxonomy	
CO1	Interpret the Liferay concepts to meet the business requirements
CO2	Analyse the Liferay features such as content creation, assets management, and permissions and authorization to get insider knowledge.
CO3	Formulate the requirements as a System Architecture and Technical Design.
CO4	Develop a real-world business application for the given scenario.
CO5	Evaluate the suitability of the architecture and design.
Text Book	• https://help.liferay.com/hc/en-us/articles/360017898972-Introduction-to-Developing-Plugins-with-Liferay-IDE
Reference Books	• https://portal.liferay.dev/learn/code-samples https://spring.io/guides

COURSE CODE	DEVELOP ENTERPRISE APPLICATIONS	TOTAL LECTURE: 30 PRACTICAL: 30
LT21B223		(LTP=2-0-4=4)

Course Objectives:

- Expalin the architecture of OmniCom and its components.
- Create a software design blueprint based on a broad design concept, and business and user requirements.
- Prepare functional and technical specifications of enterprise applications to address business and user needs.
- Develop the persona-based marketing campaign on Digital channels.
- Gain knowledge to measure the performance of the marketing campaign..

UNIT	CONTENTS	HOURS
I	**Introduction to OmniCom:** Marketing, campaign, Advertising, OmniCom Solution Overview, Architecture and Components, Control panel, Users, Sites, Apps, User Roles and Access. Plugin Configurations, Server Administration, Portal Setting	6
II	**Web Flow Design Tools and Process Engine:** Form Builder, Rulesets, Process, Email Templates, Process Diagram, Product Engine Overview, Framework, Competency Unit, Outline, Certificate, Module, Course, Product, Product view	6
III	**Lead and Opportunity Process:** Business Objective, Key Performance Indicator, Target your audience. Know the competition, Create relevant content, Publish Regularly, WeSite Design, Compelling Offer, Call Call to Action, Landing Page, Effective Form, Lead Scoring, Customized Experience, Nurture Leads, Human Interaction, Purchase Process, Retargeting, Loyal Customers, Reward Customers, Social Monitoring, Amplify Followers, Referrals, Testimonials, Measure and Optimize	6
IV	**Marketing on Digital Channels:** Spring Product Catalog, Campaign Setup, Campaign Details, Campaign List, Reports and Analysis, Template Design and Upload, Create Campaign with Multiple EDM, Favourites to send Campaign, Dynamic Data List by Subscription, Adding Dynamic Data, Creating Campaign by Subscription Based	6
V	**Marketing and Sales Analysis:** Business Analytics, Process, Corporate, MiniSite, MiniSite Lead Analytics, Contracts, Sales Order, Marketing Analytics, Export	6

Course Outcomes as per Bloom's Taxonomy

CO1	Describe the requisites of the OmniCom business.
CO2	Develop solution architecture to meet the business requirements
CO3	Implement the OmniCom Solution for an enterprise by applying the functions supported by the omni-channel platform.
CO4	Combine email and social media marketing campaigns for promoting products/services.
CO5	Evaluate the success of the campaigns
Text Book	• .MarketingMO, 2013. The Strategic Marketing Process How ro structure your Marketing Activities to Achieve Better Results. 2nd ed. s.l.:s.n.
Reference Books	• Heffelfinger., D. R., 2017. Java EE 8 application development : develop enterprise applications using the latest versions of CDI, JAX-RS, JSON-B, JPA, Security, and more. Birmingham, UK : Packt Publishing. • Marten Deinum, D. R. a. J. L., 2017. Spring recipes : a problem-solution approach. 4 ed. USA: Apress.

COURSE CODE	APPLICATION INTEGRATION	TOTAL LECTURE: 30 PRACTICAL: 30
LT21B224		(LTP=2-0-4=4)

Course Objectives:

- Identify the elements of an application integration plan
- Describe the Pros and cons, and applications of various middleware components
- Gain knowledge on SDK/ API required to develop the components to integrate with Facebook Ads, Google Ads, and oAuth integration for Social media
- Describe the features of the target environment or platforms on which applications operate
- Use appropriate troubleshooting and testing, procedures, and techniques for successful integration.

UNIT	CONTENTS	HOURS
I	**Spring Boot:** Web Dependencies, RESTful Services, Packaging Spring Boot Application, Implementing Spring Data, Security, Asynchronous Messaging, Implementing a message Consumer and Producer, Actuator, Productionalising Actutator, Info Endpoint, Metrics endpoint, Custom endpoint, Rest actuator,	6
II	**REST API:** Restful librarian, URL vs URI, Six Constraints of REST, Relations with HTTP, Who or What interacts with REST API, Tools to see Rest API in action, Request/ Response Pairs – GET, POST, PUT, PATCH and Delete, Design and Implement REST API, Test using Postman	6
III	**React JS:** Introduction to React, Setting up tools, Install React App, Create React Elements, Refactoring elements using JSX, Create a React Component, Adding properties, Working with lists, Display images with react, using fragments, Fetching data with hooks, Display data from API, Handling loading states, Router – Installation, Configuration, Incorporating component, Nesting links.	6
IV	**OAuth Integration:** Web Security, oAuth and OpenID connect, oAuth fundamentals, tokens, authentication, Facebook Integration	6
V	**Webhook Integration with External System:** Webhook Overview, Concepts, Types of Webhooks, Operations of Webhooks, Webhook Integration	6
Course Outcomes as per Bloom's Taxonomy		

CO1	List the integration requirements, Techniques, and problems/ deficiencies.
CO2	Identify suitable middleware for creating connections among various hardware and applications.
CO3	Compose an application integration plan to bring data and functionalities of different applications together.
CO4	Construct optimal functioning of modules of applications in newly integrated environments.
CO5	Examine the efficiency of integration
Text Book	• Eisenman, B., 2016. Learning React Native. 2nd ed. s.l.:O'Reilly Media, Inc.,. • Gutierrez, F., 2019. Pro Spring Boot 2: An Authoritative Guide to Building Microservices, Web and Enterprise Applications, and Best Practices. 1st ed. s.l.:Apress.
Reference Books	. • Facebook, n.d. Facebook for developers. [Online] Available at: https://developers.facebook.com/docs/react-native [Accessed 28 April 2020]. • Google, n.d. Google Docs API. [Online] Available at: https://developers.google.com/docs/api/quickstart/java [Accessed 28 Apr 2020]. • Paypal, n.d. PayPal Developer. [Online] Available at: https://developer.paypal.com/docs/accept-payments/express-checkout/ec-braintree-sdk/server-side/java/ [Accessed 28 Apr 2020].

COURSE CODE	PROJECT BASED LEARNING-II	Total Lecture: 30 Practical: 30
PB20B201		(LTP=0-0-4=2)

Course Objectives:

- Integrating the knowledge and skills of various courses on the basis of multidisciplinary projects
- Develop the skill of critical thinking and evaluation.
- To develop 21st century success skills such as critical thinking, problem solving, communication, collaboration and creativity/innovation among the students.
- To enhance deep understanding of academic, personal and social development in students.
- Employ the specialized vocabularies and methodologies.

Course Outcome as per Bloom's Taxonomy	
At the end of the course the students will be able to:	
CO 1	**Apply**[3] a sound knowledge/skills to select and develop their topicand project respectively.
CO 2	**Develop**[6] plans and allocate roles with clear lines of responsibilityand accountability.
CO 3	**Design**[6] solutions to complex problems following a systematicapproach like problem identification, formulation and solution.
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