Third Year - Semester V
Name of the Programme: Bachelor of Computer Applications
Course Code: CSA-300
Title of the Course: UI-UX Design
Number of Credits: 4 (3T + 1P)
Effective from AY: 2024-2

Pre-requisites for the Course:	None	
Course Objectives:	1. To understand user-centered design principles and practical skills in graphic design, prototyping, and usability testing. 2. To explore graphical user interfaces, affinity diagrams, personas, and scenarios. 3. To apply Acquire an understanding of various tools to enhance the design of user experiences. 4. To design wireframes and prototypes that prioritize user experience through iterative design, incorporating usability tests.	
Unit	**Content:**	**No of hours 75 (45T + 30P)**
I	**FOUNDATIONS OF UI DESIGN** ● Introduction to User Interface (UI) Design, The Relationship Between UI and UX, Roles in UI/UX, Formal/Active Elements of Interface Design, Composing the Elements of Interface Design, UI Design Process (Core stages) ● Visual and UI Principles - UI Elements and patterns- Interaction behaviors and Principles	**15**
II	**FOUNDATIONS OF UX DESIGN** ● Introduction to User Experience (UX) Design, application, and relevance in the current scenario, 5 Elements of UX - strategy, scope, structure, skeleton, surface ● Good and poor design, understanding your users, tools and methods used for UX design research, user needs and its goals, knowing about business goals ● Designing the Experience - Elements of User Experience, Visual Design Principles, Functional Layout, Interaction design, Introduction to the Interface, Navigation Design, User Testing, Developing and Releasing Your Design.	**15**
III	**UI/ UX Design and Testing** ● User Study- Interviews, writing personas: user and device personas, Creating User Stories, Creating Scenarios, Flow Diagrams, Flow Mapping, Information Architecture	**15**

	• User Context, Responsive Design-Wireframing-Creating Wireflows- building a Prototype- building high-fidelity mockups, Sharing and Exporting Design, Conducting Usability tests, Other Evaluative User Research Methods in brief.	
Unit IV Practical	**The practical exercises can be implemented utilizing any of the tools listed below.** • Figma, Adobe XD, Penpot, Pencil, GIMP, Inkscape, etc.	**Practical Hours (30)**
Week 1 & 2	• Develop proficiency in iterative user-centered design for graphical user interfaces. • Construct user interfaces for diverse applications.	**04**
Week 3 & 4	• Assess the user experience design of products or applications effectively. • Exhibit user experience skills in the process of product development	**04**
Week 5 to 7	• Generate wireframes and prototypes as integral components of the design process. • Implement responsive design techniques for seamless user experiences across devices. • Employ A/B testing to evaluate and optimize different design variations.	**06**
Week 8 & 9	• Create detailed personas and scenarios to inform the UI/UX design process. • Visualize user interactions and navigation through the development of flow diagrams and wireflows.	**04**
Week 10 & 11	• Develop an effective information architecture for a given project, focusing on content organization and structure. • Translate wireframes into high-fidelity mockups, incorporating visual design elements.	**04**
Week 12 & 13	• Develop an interactive prototype that simulates user interactions with the finalized UI design. • Create and implement a comprehensive user testing plan for a UI/UX design project.	**04**
Week 14 & 15	• Assess the accessibility of a given UI design to ensure it meets inclusive design standards.	**04**

Pedagogy:	**Suggested strategies for use to accelerate the attainment of the various course outcomes.** 1. The lecture method need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. You may use a. Video/Animation to explain various concepts. b. Collaborative, Peer, Flipped Learning, etc. 2. Ask at least three HOT (Higher-Order Thinking) questions in the class, which promotes critical thinking. 3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, and develops design thinking skills such as the ability to design, evaluate, generalize, & analyze information rather than simply recall it. 4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding 6. To promote self-learning, give at least one assignment where they can complete one MOOCs (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations.
References/ Readings:	**Main Reading:** 1. Don Norman. (November 2013). *The Design of Everyday Things*. Basic Books. 2. Joel Marsh (2022). *UX for Beginners.* OReilly. 3. Wilbert O. Galitz (2007). *The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques (Third Edition).* Wiley Publishing. **Additional Reading:** 1. Jesse James Garrett (2011). *The Elements of User Experience: User-Centered Design for the Web and Beyond (Second Edition).* Pearson Education. 2. Russ Unger and Carolyn Chandler (2012). *A Project Guide to UX Design: For user experience designers in the field or in the making (Second edition).* New Riders Publishing USA.
Course Outcomes:	**On completion of the course, students will be able to:** 1. Remember the iterative user-centered design of graphical user interfaces and build UI for user applications. 2. Understand the UX design of any product or application 3. Apply UX skills in product development 4. Design Wireframe and Prototype

Name of the Programme: Bachelor of Computer Applications
Course Code: CSA 301
Title of the Course: Full Stack Development
Number of Credits: 4 (3P + 1 Tutorial)
Effective from AY: 2024-25

Pre-requisites for the Course:	Basics of Web Technology & Web App Development	
Course Objectives:	1. To Learn JavaScript Fundamentals for Full-Stack Development 2. To Write Robust Backend APIs with Node.js 3. To Design Dynamic User Interfaces with React.js 4. To Integrate Data Flow between Frontend application and Backend Application	
Units & Weeks	**The broad area of practical concepts are mentioned / suggested below.**	**No of hours 105 (90P + 15 Tutorials)**
Tutorial Session Instructions	1. Tutorial lecture of 1 hour duration to be conducted each week. 2. Concepts needed for the conduct of Practical Sessions to be discussed. 3. These sessions may also be utilized for the doubt clearance	
I	**Introduction to Node.js**	**42 (36 + 06)**
Week 1	● Installation of Node.js ● Learn Node.js REPL ● Understanding Node js folder Structure ● Configuration of Package.JSON file in a new web application. ● Install Express ● Create a server using Express	**7**
Week 2	● Node Modules ● Module Dependencies ● Module Functionality	**7**
Week 3	● The Event Loop, Concurrency, Asynchronous Coding ● Callback Functions, Calling Conventions, Exception Handling ● Event Emitters, Listening for Events	**7**
Week 4	● Promises, Promise Chaining ● Modules, Command Line Arguments ● Working with the File System, Reading Files,	**7**

	Writing Files	
Week 5	• Readable Streams, Writable Streams • The Standard Streams, Creating a Server, Routes • Accessing Request Headers • Create gateway using node js	**7**
Week 6	• Create cron jobs using Node js • Blocking vs Non Blocking methods • Webpack	**7**
II	**Backend APIs**	**28 (24+04)**
Week 7	• Installing Sequelize ORM for MySQL • Connecting to database • Testing the connection • Closing the connection	**7**
Week 8	• Create Models using sequelize • Sequelize Migration • Model Querying-Basics	**7**
Week 9	• Model Querying-Finders • Validation and Constraints • Raw Queries	**7**
Week 10	• Sequelize Association(1:1,1:M) • Advanced M:N Associations	**7**
III	**Frontend Framework**	**28 (24+04)**
Week 11	• Installation of React js • Components (Build-in and Custom) • Props • States	**7**
Week 12	• Hooks(useState, useReducer, useContext, useRef, useEffect, useMemo, useCallback etc.)	**7**
Week 13	• Routes in React Js • Navigation	**7**
Week 14	• Redux • dispatch	**7**
IV	**Integrate between Frontend and Backend Application**	**7 (6+1)**
Week 15	• Integrate Node js Application with React js	**7**

Pedagogy:	1. Course delivery pattern, evaluation scheme, prerequisite shall be discussed at the beginning. 2. Tutorials preferably to be conducted with the aid of multimedia projector, black board, LMS, mini projects etc. 3. One live project based on the course content may be given to the students to evaluate how learning of objectives was achieved. 4. The course has a separate laboratory, where students gain hands on experience of working with the various frameworks
References/ Readings:	**Text Book** 1. Ethan Brown (2014). *Web Development with Node and Express: Leveraging the JavaScript Stack (Second edition).* O'Reilly. 2. Frank W. Zammetti (2020). *Modern Full-Stack Development.* Apress 3. Greg Lim. (July 2021). *Beginning MERN Stack Development. ISBN-10 9811815526.*Greg Lim.
Course Outcomes	**On completion of the course, students will be able to** 1. Understand JavaScript fundamentals 2. Write Robust Backend APIs with Node.js 3. Design Dynamic User Interfaces with React.js: 4. Integrate Data Flow between Frontend and Backend applications

Name of the Programme : Bachelor of Computer Applications
Course Code : CSA-302
Title of the Course : Cloud Computing
Number of Credits : 4 (3T + 1P)
Effective from AY : 2024-25

Pre-requisites for the Course:	The student should have basic knowledge of operating systems and computer networks.	
Course Objectives:	1. To describe the fundamentals of Cloud computing. 2. To understand the architecture and the types of Cloud systems. 3. To apply the concepts of service models and deployment models to decide suitability of migrating to cloud solutions. 4. To compare the services and applications made available by leading Cloud Service Providers	
Units	**Content**	**No of hours 75 (45T+30P)**
I	**Introduction to Cloud Computing** **Overview of Computing Paradigm** • Recent trends in Computing, Types of Computing: Parallel/Distributed computing, Grid Computing, Utility Computing, Cluster Computing, Cloud Computing. **Cloud Computing** • Introduction to Cloud Computing, Properties and Characteristics, Cloud service providers, Cloud applications, Cloud Architecture, Cloud Service Models **Deployment Models** • Types: Public Cloud, Private Cloud, Hybrid Cloud, Community Cloud; Key Drivers to adopting Cloud; Challenges and Issues • Popular Cloud Vendors (Amazon, Google, Microsoft etc.)	**15**
II	**IaaS - Infrastructure as a Service** • Introduction to Virtualization, Characteristics of Virtualized environment, Virtualization of Cloud, Types of Virtualization, Pros and Cons of Virtualization • Technology Examples- Xen, VMware, Microsoft Hyper-V **Capacity Planning** • Introduction, Defining Baseline and Metrics-Baseline Measurements, System Metrics, Load Testing, Resource Ceilings, Server and Instance types; Network Capacity, Scaling	**15**

III	**PaaS & SaaS** **Platform as a Service** • Introduction: Introduction to PaaS, Characteristics, Service Oriented Architecture (SOA), Applications, Issues and challenges. • Cloud Platform and Management: Computation, Storage, Case studies, Examples: Google App Engine, Microsoft Azure, SalesForce.com, Amazon AWS **Software as a Service** • Introduction to SaaS, Characteristics, Web Services, Web 2.0, Web OS, APIs, Service management, SaaS Implementation, Security, Case studies, Cloud Issues and Challenges: Cloud provider Lock-in, Security	**15**
IV	**List of Practicals:** The broad area of practical problems is mentioned/ suggested below:	**30**
Week 1 & 2	• Understanding Computer Network fundamentals and Designing LANs	**05**
Week 3 to 10	• Working on tools used in cloud computing online a) Storage b) Sharing of data c) Manage your calendar, to-do lists (e.g. Office365) d) A document editing tool • Leveraging any cloud service to work on document, spreadsheet, presentation, task management and collaborative tools in real time; chat with other collaborators. (e.g. Google sheet, docs & Google Meet, Google Keep)	**15**
Week 11 to 15	• Enlisting various companies in cloud business and the corresponding services provided by them and tag them under SaaS, PaaS & IaaS. • Exploring public cloud service providers' tools for exploring the usage of IaaS, PaaS and SaaS cloud services. a. AWS EC2 / Azure Compute b. AWS S3 / Azure Storage c. AWS VPC / Azure Vnets d. AWS Security / Azure Security	**10**
Pedagogy	1. The lecture method need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. You may use a. Video/Animation to explain various concepts. b. Collaborative, Peer, Flipped Learning, etc. 2. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 3. Explore the cloud platforms to solve real life problems.	

	4. To promote self-learning, give at least one assignment where they can complete one MOOCs (certificate or equivalent) course wherever necessary. Test their understanding through quizzes or presentations.
References/ Readings:	**Main Reading:** 1. Buyya, R., Vecchiola, C., & Selvi, T. (2013). *Mastering Cloud Computing*. TMH. 2. Halper, F., Hurwitz, R., Bloor, R., & Kaufman, M. (2010). *Cloud Computing For Dummies.* Wiley India Pvt. Ltd. **Additional Reading:** 1. Buyya, R. K., Broberg, J., & Goscinski, A. M. (2011). Cloud Computing: Principles And Paradigms. Wiley India Pvt. Ltd. ISBN-13: 978-81-265-4125-6 2. Sosinsky, B. (2011). Cloud Computing Bible. Wiley India Pvt. Ltd. ISBN-13: 978-81-265-2980-3
Course Outcomes:	**On completion of the course, students will be able to:** 1. Recall the fundamentals of cloud computing. 2. Understand the architecture and the types of cloud servicemodels 3. Apply the concepts of service models and deployment models for for migration to cloud. 4. Analyze the services and applications made available by leading Cloud Service Providers

Name of the Programme : **Bachelor of Computer Applications**
Course Code : **CSA-303**
Title of the Course : **Internet Technologies**
Number of Credits : **2 (2T)**
Effective from AY : **2024-25**

Pre-requisites for the course:	None	
Course Objectives:	1. To understand the anatomy of the internet and the internet addressing Scheme. 2. Identify common security threats and attacks. 3. Utilize crawling and bots for efficient search engine performance.	
Units	**Content**	**No of hours**
I	**TCP/IP – Internet Technology and Protocol** ● Network Definition ● Network Components & Hardware ● Types of Networks: Peer to Peer, Client Server ● TCP/IP Structure **Network Communication:** ● Internet Layer Logical Addresses (IPv4): Classful and Classless Addressing, sub-netting, IPv4 vs IPv6. ● Network Address Translation (NAT), basics of ISPs ● Process-to-Process Delivery, Connectionless vs Connection Oriented and Reliable vs Unreliable; TCP and UDP ● DHCP, HTTP and HTTPS, DNS, TLDs	**15**
II	**Network Security** ● Overview of Network Security ● Importance of Firewalls in Network Security ● Common Security Threats and Attacks ● Basics of Firewalls - Definition and Purpose of Firewalls ● Aspects of security **Search Engines** ● Introduction ● Components of Search Engine ● Working of Search Engine in details **Internet Applications** ● FTP, Telnet, Email, Chat ● World Wide Web ● E-Commerce and Security Issues ● Emerging Trends	**15**

Pedagogy:	**Suggested strategies for use to accelerate the attainment of the various course outcomes.** 1. Lecture method need not be only a traditional lecture method, butAlternative effective teaching methods could be adopted to attain the outcomes. You may use a. Video/Animation to explain various concepts. b. Collaborative, Peer, Flipped Learning etc. 2. Ask at least three HOT (Higher-Order Thinking) questions in theclass, which promotes critical thinking. 3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and Analyze information ratherthen simply recall it. 4. Introduce Topics in manifold representations.Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.Discuss how every concept can be applied to thereal world . 5. To promote self-learning give at least one assignmentwhere they can complete at least one MOOCs (certificate or equivalent) course out of lecture hour. 6. Test their understanding through quizzes or presentations.
References/ Readings:	**Main Reading:** 1. Andre S. Tanenbaum (2018). *Computer Networks 4th Edition.* Pearson Publication. 2. Greenlaw R and Hepp E (2007). *Fundamentals of Internet and www, 2nd EL.* Tata McGrawHill 3. Kurose, J. F., & Ross, K. W. (2017). *Computer Networking: A Top-Down Approach (6th ed.).* Addison-Wesley.
Course Outcomes:	**On completion of the course, students will be able to:** 1. Recall the internet technologies 2. Understand the development of the internet ,the anatomy and growth. 3. Analyze the working of different protocols.

Name of the Programme: Bachelor of Computer Applications
Course Code: CSA - 321
Title of the Course: Internship
Number of Credits: 4
Effective from AY: 2024-25

Pre-requisites for the Course:	None	
Course Objectives:	1. To carry out work-based vocational education and training to enhance substantial skill for employability at Semester-V. 2. To promote Analyze knowledge-gap, and plan & skill upgrade through training and self-development mode. 3. To develop decision-making and teamwork skills. 4. To provide sufficient hands-on learning experience related to the design, development and analysis of suitable product / process so as to enhance the technical skill sets in the chosen field.	
Units	**Content**	**No of hours**
I	1. The internship is to be carried-out by the student individually (or in a group of 5) and to be completed during the duration of semester-V in the field of Computer Applications. 2. The internship may be taken in any IT or IT enabled services Industry (in part time mode if permitted) or at the College (home institution). 3. The internship course shall include set of the following activities (but not limited to) in order to develop confidence, aptitude and skills during the course of internship: a. Orientation on the Internship process, conduct and expected course outcomes. b. Internship topic Identification: A list of topics (social/ organizational/ academic/ any other area) may be prepared by the College. c. Identification of tools & technologies needed. d. Gap Analysis of knowledge / skills needed to upgrade upon through training, workshop, and self-learning mode. e. Study journals / entrepreneurs of related & relevant area. f. Getting trained in the area of gaps identified as mentioned below i. Self-enroll in the training in online/offline mode at any institution of his/her choice. ii. Participation in the hands-on training/ workshop in the area of Application Development Tools & Technologies such as Software Quality Assurance, IoT, Drone Technology, Machine	**120**

	Learning, AR / VR, Concepts & Tools, report writing, etc. iii. Participation in the seminar related to internships and project best practices, latest tools and technologies, project/ internship topics identification, entrepreneurship, etc. 4. The College may decide till what extent to include and schedule the activities listed at point number (3) above in the academic year as per the need. More activities may be conducted according to the need. 5. The College may also decide whether the student interning in the industry (on part time) to be allowed to attend the set of activities scheduled as per point number (4) above or not. This is to be done well in advance, in consultation with the student and the institute/ organisation where student is interning. 6. At-most 60 hours of the time duration may be utilized to complete the tasks scheduled as per point number (4) above. This may be ensured by verifying the internship diary by the internship supervisor (industry supervisor). 7. The topic of the Internship (Or the training course & related project) shall be finalized by the student in consultation with the internship in-charge of the College/Programme/Industry Mentor (External Guide) of the company/institution in which the student is doing his/her internship. 8. The internship (internship project) is to be completed by the student in the 13th week of the semester. 9. The industry supervisor shall certify, in the prescribed proforma, that the Internship is the work of the student completed under her/his supervision. 10. A student shall submit their Internship (or training & project) report to the College through the Industry supervisor (or training & project supervisor) at-least 15 days prior to the start date of Semester End Examination of semester V, or when intimated by the Faculty coordinator. 11. Ordinarily, no student shall be permitted to submit the Internship report after the due date specified by the College. 12. The student is expected to present his/her work at the end of the Internship and should submit the internship report in the format as prescribed by the University. 13. Internship Report, Presentation and Viva shall be the integral component of the evaluation. 14. Students are instructed to refer the **"Computer**	

	Applications Internships and Project Guide" prescribed by University for all necessary guidelines, instructions and formats.	
Pedagogy:	● As per the specification of Institution where student is seeking internship. ● As per the specification mentioned in the "Computer Applications Internships and Project Guide".	
References/ Readings:	1. Computer Applications Internships and Project Guide. 2. References as per the need of internship	
Course Outcomes:	**On completion of the course, students will be able to:** 1. Understand the amount of complexity, effort and planningneeded in solving real-world problems. 2. Appreciate the need of training, gap analysis, and self-development. 3. Demonstrate professional and ethical responsibility. 4. Design and develop solutions of the internship problem throughimplementation of the skills developed during the course of study.	

Name of the Programme : Bachelor of Computer Applications
Course Code : CSA - 361
Title of the Course : Summer Internship
Number of Credits : 2
Effective from AY : 2024-25

Pre-requisites for the Course:	If students wishes to continue for Semester-V of Computer Applications Programme.	
Course Objectives:	1. To expose students as interns/trainees to the industrial environment. 2. To provide a platform to learn skills required for employability. 3. To inculcate work ethics.	
Content	1) This internship is to be carried-out by the students individually and to be completed in four weeks (30 hours per week) of duration during the summer term, i.e. *duration between end of semester IV and beginning of semester V.* 2) The internship topic shall be from the broad discipline of area of study i.e. Computer Application or allied. 3) The internship may be taken in any Firm, Industry, Organizations, , Health and allied areas, Local Governments (such as Panchayats and Municipalities), Parliament or elected representatives, media, artists, crafts persons, NGOs and other such organizations to improve their employability. 4) Online Internships are allowed. 5) If a student is unable to find the internship in any of the organization mentioned at **Sr. No. 3 and 4** above, then the student shall do the following: a) **Training (or self-learning):** Student shall enroll for any skill based vocational course of their choice, in any mode (Online/Offline), and at any institution of his/her choice. The course have to be completed in a maximum duration of 30 hours within 1.5 weeks duration. b) **Project:** A project of minimum 30 hours is to be completed in maximum duration of 3 weeks by using the skills developed in the training undertaken as per point no. (5.a) above and the skill developed during First and Second Year of the Computer Applications Programme. Guidance with respect to the project may be taken by the internship in-charge of the College. 6) The topic of the Internship (Or the training course & related project) shall be finalized by the student in consultation with the internship in-charge of the College/Programme/Industry Mentor (External Guide) of the company/institution in which the student is doing his/her internship (Or training).	**60 Hours**

	7) Upon completion of the internship program, the industry supervisor shall certify the intern, in a prescribed proforma, based on the conduct of the intern under her/his supervision. 8) A student shall submit their Internship (or training & project) report to the College through the Industry supervisor (or training & project supervisor) not later than one week after the start of fifth semester, or when intimated by the Faculty coordinator. 9) Ordinarily, no student shall be permitted to submit the Internship report after the due date specified by the College. 10) The student is expected to present his/her work at the end of the Internship and should submit the internship report in the format as prescribed by the University. 11) Internship Report, Presentation and Viva shall be the integral component of evaluation. 12) Students are instructed to refer the **"Computer Applications Internships and Project Guide"** prescribed by University for all necessary guidelines, instructions and formats in details.	
Pedagogy:	1. As per the specification of Institution/organization where student is seeking internship. 2. As per the specification mentioned in the "Computer Applications Internships and Project Guide".	
References/ Readings:	1. Computer Applications Internships and Project Guide. 2. As per the directives of the Industry/Organization.	
Course Outcomes:	**On completion of the internship program, students will be able to:** 1. Understand the industrial environmental. 2. Apply the concepts and skills learnt during employment and life-long learning. 3. Inculcate discipline and work ethics.	

Third Year - Semester VI
Name of the Programme: Bachelor of Computer Applications
Course Code: CSA-304
Title of the Course: Cyber Security
Number of Credits: 4 (3T + 1P)
Effective from AY: 2024-25

Pre-requisites for the Course:	The student should have basic knowledge of information technology.	
Course Objectives:	1. To understand the concepts of cyber security, challenges and its awareness. 2. To comprehend the underlying principles of various cybersecurity techniques and technologies. 3. To apply cyber security measures to safeguard information and systems.	
Units	**Content**	**No of hours 75 (45T+30P)**
I	**a. Fundamentals of Cyber Security and Threat Landscape** ● Importance and challenges in Cyber Security ● Cyberspace, and Cyber threat ● Cyber warfare ● CIA Triad ● Cyber Terrorism ● Cyber Security of Critical Infrastructure **b. Cyber Attacks and Intrusion Techniques** ● Types of Hackers - Hackers and Crackers ● Cyber-Attacks and Vulnerabilities ● Malware threats ● Sniffing ● Gaining Access - Escalating Privileges ● Executing Applications ● Hiding Files ● Covering Tracks ● Worms, Trojans, Viruses, Backdoors ● Unauthorized Access ● Computer Intrusions ● White collar Crimes ● Pornography ● Software Piracy ● Mail Bombs ● Exploitation	**15**

II	**a. Ethical Hacking and Information Security Practices** ● Ethical Hacking Concepts and Scopes ● Threats and Attack Vectors ● Information Assurance ● Threat Modeling ● Enterprise Information Security Architecture ● Vulnerability Assessment and Penetration Testing **b. Investigation** ● Investigation Tools ● eDiscovery ● Digital Evidence Collection ● Evidence Preservation ● E-Mail Investigation ● E-Mail Tracking ● IP Tracking ● E-Mail Recovery ● Hands on Case Studies ● Recovering Deleted Evidences ● Password Cracking	**15**
III	**a. Social Engineering and Insider Threats** ● Types of Social Engineering ● Insider Attack ● Preventing Insider Threats ● Social engineering Targets and Defence Strategies ● Securing data transit **b. Legal Framework and Countermeasures in Cyber Security** ● IT Act ● Hackers-Attack-Countermeasures ● Web Application Security ● Counter Cyber Security Initiatives in India ● Cyber Security Incident Handling ● Cyber Security Assurance	**15**
IV	**Practicals Works** The concepts learned in the units from I to III are required to be implemented practically. The broad area of practical problems is mentioned below.	**(30 Hours)**
Week 1 to week 5	● Implementation to gather information from any PCs connected to the LAN using whois, port scanners, network scanning, Angry IP scanners etc. ● Implementation of MITM-attack using wireshark or any network sniffers.	**10**

Week 6 to week 10	● Implementation of Windows security using firewall and other tools. ● Implementation to identify web vulnerabilities, using OWASP project. ● Disk Encryption Using Windows BitLocker, Disk Encryption Using Open Source Tools.	**10**
Week 11 to week 15	● Implementation to gather information from any search engine about a target entity. ● Implementation of IT Audit, malware analysis and Vulnerability assessment.	**10**
Pedagogy	1. The lecture method need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. You may use a) Video/Animation to explain various concepts. b) Collaborative, Peer, Flipped Learning, etc. 2. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, and develops design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it. 4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.	
References/ Readings:	1. MariE-Helen Maras. (2nd Edition, 2014). *Computer Forensics: Cyber criminals, Laws, and Evidence.* Jones & Bartlett Learning. 2. Nihad Hassan, Rami Hijazi (2017). *Digital Privacy and Security Using Windows: A Practical Guide*. Apress. 3. Nilakshi Jain Wiley (2020). *Cyber Security and Cyber Laws.* Wiley. 4. Nina Godbole (2011). *Cyber Security.* Wiley.	
Course Outcomes:	**On completion of the course, students will be able to:** 1. Remember Legal Framework and Countermeasures of Cyber Security 2. Understand the key concepts of cyber security, threat awareness and the fundamental principles of ethical hacking, techniques and tools. 3. Apply the understanding of cyber security, threat awareness and the ethical hacking tools & techniques. 4. Analyse the methods for authentication, access control, intrusion detection and prevention in Cyber Security.	

Name of the Programme : Bachelor of Computer Applications
Course Code : CSA-305
Title of the Course : Mobile Application Development
Number of Credits : 4 (3P + 1 Tutorial)
Effective from AY : 2024-25

Pre-requisites for the Course:	None	
Course Objectives:	1. To understand the features and installation of Flutter 2. To get understanding of basic constructs of Dart programming. 3. To develop simple mobile applications in Flutter using dart and firebase.	
Units & Weeks	**Content**	**Noof hours 105 (90P + 15 Tutorials)**
Tutorial Session Instructions	1. Tutorial lecture of 1 hour duration to be conducted each week. 2. Concepts needed for the conduct of Practical Sessions to be discussed. 3. These sessions may also be utilized for the doubt clearance	
I	**Introduction**	**07**
Week 01	Getting Started with Android – Installing the Development Environment, Configuring Android Stack, Configuring and Installing Flutter SDK, Creating a New Flutter Project and Understanding Folder Structure.	07
II	**Dart Programming**	**35**
Week 02	Introduction to Dart Programming: Using dart pad, data types, variables, Dart Programming: loops, decision making, functions	7
Week 03 & week 04	OOP concept in dart, getters and setters Exception handling and debugging	14
Week 05 & week 06	Asynchronous and synchronous operations async, await, streams, listening to streams, broadcast streams, manipulating streams	14
III	**Flutter**	**42**
Week 07 to week 09	Introduction to Flutter Widgets: Scaffold Widget. Image Widget, Container Widget, Column and Row Widgets, Icon Widget Layouts in Flutter, Card Widget, Stateful and Stateless Widgets Hot Reload and Hot Restart Styles and assets: Custom fonts, assets in flutter, media query, Null safety *Create a Restaurant Menu using Flutter Widgets* Button Widget: FloatingActionButton, RaisedButton,	21

	FlatButton, and IconButton, DropdownButton Button Widget: OutlineButton, ButtonBar, PopupMenuButton Navigation and Routing: Navigate to a New Screen and Back, Navigate with Named Routes, Send and Return Data Among Screens	
Week 10 to week 12	Motion Rich Widgets: BottomNavigatorBar Widget, DefaultTabController, TabBar, and TabBarView Widgets Motion Rich Widgets: ListTile Widget, ListView Widget, Drawer widgets Motion Rich Widgets: DataTable Widget, SelectableText Widget,Stack Widget Input and Selections: Text Field Widget, CheckboxGroup and RadioButtonGroup Widgets .DatePicker, Time Picker, Slider Widget, Switch Widget Dialogs, Alerts, and Panels: Alert Dialog Widget, Cupertino Alert Dialog Widget, Expansion Panel Widget, Snack Bar Widget *Creating a Hotel Reservation App using Widgets*	21
IV	**Firebase**	**21**
Week 13 to week 15	Firebase with flutter: Add firebase to flutter application, register app with firebase, firebase database and authentication Firebase with flutter: firebase cloud messaging, notification handling, using firebase storage with flutter Create a User Profile Interface using Firebase, Adding a Google Map on Your Flutter App Screen, Adding a Google Map Marker	21
Pedagogy:	**Suggested strategies for use to accelerate the attainment of the various course outcomes.** 1. Lecture methods need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. You may use a) Video/Animation to explain various concepts. b) Collaborative, Peer, Flipped Learning etc. 2. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it. 4. Introduce Topics in manifold representations. 5. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 6. Discuss how various concepts can be applied to the real world - and when that's possible, it helps improve the students' understanding	

	7. To promote self-learning give atleast one assignment where they can complete atleast one MOOCs (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations. 8. One internal practical exam will be conducted as a part of internal evaluation. 9. Practical shall be performed in the laboratory as indicated in the syllabus. 10. A Hand written Hard Copy (or digital copy) of the journal shall be maintained clearly mentioning the name of the experiment and other required information.
References/ Readings:	**Main Reading** 1. Marco L. Napoli. (September 2019). *Beginning Flutter: A Hands On Guide to App Development (First Edition).* Wiley publication. 2. Nathan Metzler. (April 2022). *Dart Programming for Beginners: An Introduction to Learn Dart Programming with Tutorials and Hands-On Examples.* Kindle **Additional Reading** 1. Simone Alessandria, Brian Kayfitz. (2021). Flutter Cookbook.Packt Publishing. 2. Thomas Bailey, Alessandro Biessek**.** (2023). Flutter for Beginners (Third Edition). Packt Publishing.
Course Outcomes:	**On completion of the course, students will be able to:** 1. Recall the installation process of Flutter, Dart and Firebase. 2. Understand the various concepts and constructs of Mobile Application Development using Flutter, Dart and Firebase. 3. Design and Develop animation & application using Flutter,Dart and Firebase. 4. Debug and Analyze the programming logic.

Name of the Programme : Bachelor of Computer Applications
Course Code : CSA 306
Title of the Course : Machine Learning
Number of Credits : 4 (3T +1P)
Effective from AY : 2024-25

Pre-requisite for the Course	**None**	
Course Objectives :	1. To learn the fundamentals of Data Analysis and the Science behind it. 2. To apply Machine Learning algorithms for performing complex data analysis. 3. To discover interesting patterns, correlations, associations and causal structures in the data found in data repositories. 4. To solve problems using fundamental concepts (Case Studies)	
UNIT	**Content**	**No of Hours (75) (45T + 30P)**
I	**Fundamentals of Analytics and Statistics** • Various Data Science Disciplines: Data Science and Business Buzzwords, Difference between Analysis and Analytics, Continuing with BI, ML and AI. • Careers in Data Science: Finding the Job - What to Expect and What to Look for. • Identification of a data science project. **Data Wrangling and Data Analysis** • Roadmap to Data Science workflow, Introduction and Implementation of Inferential and Descriptive Statistics. • Cleaning Data: Missing Values, Outliers. • Preparing Data for Modelling: Transformations, Derived Variables. Visualization Methods and Applications. • Case Studies. **Feature Selection and Dimensionality Reduction** • Why to do Feature Selection? • Feature Selection Techniques • Feature Selection vs Dimensionality Reduction	**15**
II	**Introduction to Machine Learning, Regression And Classification Models** • Overview of Machine learning • Overview of Statistical learning • Supervised Versus Unsupervised Machine Learning • Regression Versus Classification Problems • Simple Linear Regression • Multiple Linear Regression	**15**

	• Linear Discriminant Analysis • Logistic Regression • Naive Bayes • K-Nearest Neighbours • Artificial Neural Networks	
III	**Tree Based Model, Unsupervised Learning, Association** **Basics of Decision tree** • Bagging and Boosting • Random Forest • Gradient Boosting Machines **Overview of Clustering** • K-means Clustering • K-medoid **Overview of Association Rule Mining** • Market Basket Analysis	**15**
IV	**PRACTICAL** **Tools to be used** **Programming Languages** : Python / R **Packages required** : numpy, pandas, scikit-learn **List of Practicals :**	**30**
Week 1 & week 2	• Merging several data sources into one data-set for analysis • Identifying gaps or empty cells in data and either filling or removing them and deleting irrelevant or unnecessary data • Identifying severe outliers in data and either explaining the inconsistencies or deleting them to facilitate analysis	**04**
Week 3 to week 5	Data Wrangling and Data Analysis • Feature selection and Data reduction • Covariance-based • Feature Selection using ANOVA F-Score	**06**
Week 6	Introduction to Machine Algorithms	**02**
Week 7 to Week 12	Regression And Classification Models and Tree Based Models • Experiments using Linear and Multiple Regression • Experiments using Decision Tree • Experiments using Random Forest	**12**
Week 13 to Week 15	Unsupervised Machine Learning and Association • Experiments using K-Means Clustering • Experiments using Dendrogram	**06**

Pedagogy:	1. At the start of course, the course delivery pattern, evaluation scheme, and prerequisites will be discussed. 2. Lectures to be conducted with the aid of multimedia projector, black board, etc. 3. One internal written exam will be conducted as a part of internal theory evaluation. 4. One assignment based on the course content for each unit will be given to the student and evaluated at regular intervals. 5. The course has a lab component as an integral part, where students have an opportunity to build an appreciation for the concepts being taught in Theory. 6. Experiments to be performed in the laboratory as suggested in the syllabus. **7.** Data Science Projects of basic level, if needed. **8. Data Science Methodology** ● Problem to Approach ● Requirements to collection ● Understanding to preparation ● Modelling to Evaluation ● Deployment to Feedback
References:	1. Jiawei Han, Micheline Kamber, 3rd Edition(2011). *Data Mining Concepts and Techniques.* Morgan Kaufmann. 2. K.P. Soman, Shyam Diwakar and V. Ajay (2016). *Insight into Data mining Theory and Practice.* Prentice Hall of India. 3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar (2016). *Introduction to Data Mining.* Pearson Education.
Course Outcomes:	**At the end of the course, the students will be able to** : 1. Demonstrate a solid understanding of the fundamentals of Machine Learning. 2. Apply Machine Learning algorithms proficiently to perform complex data analysis tasks. 3. Identify and interpret interesting patterns, correlations, associations, and causal structures within diverse datasets. 4. Solve data science problems using fundamental concepts through case studies.

Name of the Programme : **Bachelor of Computer Applications**
Course Code : **CSA - 307**
Title of the Course : **Project**
Number of Credits : **4**
Effective from AY : **2024-25**

Pre-requisites for the Course:	None	
Course Objectives:	1. To provide students with knowledge of practical skills for various technological applications. 2. To enable the student to develop an application with their respective domain. 3. Ensuring the formation of research thinking of students, forming a clear idea of the main task and ways to solve them. 4. Developing the basic skills for problem-solving that arise in the course of research/development activities.	
Units	**Content**	**Noof hours**
I	1. The Project is to be carried out in a group of students (as mentioned in ordinance OA38) and is to be completed during the duration of semester VI in the field Study. 2. The Project shall include a set of the following activities (but not limited to) to develop confidence, aptitude, and skills during the course of the project a) Orientation on the process, conduct, and expected course outcomes. b) Topic Identification: A list of topics (social/ organizational/ academic/ any other area) may be prepared by the students. c) Identification of tools and technologies needed. d) Conduct a literature review and understand gap analysis. e) Getting trained in the area of gaps identified. 3. The Project Guide in every college may decide to what extent to include and schedule the activities listed at point number 2 in the academic year as per the need. More activities may be conducted according to the need. This is to be done well in advance, in consultation with the Project Guide and the institute/organization where students are undergoing training. 4. The topic of the project shall be finalized by the student in consultation with the Project Guide. 5. The background work, group formation, assignment of guide, selection of project titles, problem definition formulation, decision on technology stack, and planning	**120**

	may be completed before the beginning of 6th Semester in consultation with the project guide. 6. The project is to be completed by the student by the 11th week of the semester. 7. The Project Guide shall certify, in the prescribed proforma, that the project is the work of the student completed under her/his supervision. 8. A student shall submit their project report in the format as prescribed by the University to the College at least a month before the start date of the Semester End Examination of semester VI, to be sent to the External Examiner decided by the university. 9. No student shall be permitted to submit the project report after the due date specified by the College/ University. 10. Project Report, Presentation, and Viva shall be the integral component of the evaluation jointly conducted by the Project Guide and External Examiner. 11. The final project report will be certified by the Project Guide, External examiner, and the head of the institution. 12. Students are instructed to refer to the **Computer Applications Project Manual** prescribed by the University for all necessary guidelines, instructions and formats.	
Pedagogy:	As per the specification mentioned in the **Computer Applications Project Manual**.	
References/ Readings:	Computer Applications Project Manual.	
Course Outcomes:	**On completion of the course, students will be able to:** 1. Understand the amount of complexity, effort, and planning needed in solving real-world problems. 2. Demonstrate the need for training, gap analysis, and self-development, professional and ethical responsibility. 3. Design and develop solutions to real-world problems adhering to coding learned during the course of study. 4. Evaluate using quality testing standards.	

Name of the Programme: Bachelor of Computer Applications
Course Code: CSA-322
Title of the Course: Social Media Marketing and Analytics
Number of Credits: 4 (3T+1P)
Effective from AY: 2024-25

Pre-requisites for the Course:	None	
Course Objectives:	1. To understand the concept of Social Media Marketing platform. 2. To acquire understanding of Facebook, Instagram, LinkedIn, Twitter, Pinterest Marketing 3. To understand video and mobile platform advertising and concepts of web and google analytics 4. To Measure, and Analyze Social Media Marketing Campaigns	
Units	**Content**	**No of hours 75 (45T + 30P)**
I	**Introduction to Social Media Marketing** ● Evolution and significance of social media. ● Understanding the potential benefits of social media. ● Overview of different social media platforms. **Managing Information – Aggregators** ● Introduction to information aggregators. ● Effectively managing and curating content. **Facebook & Instagram Marketing** ● Creating and managing groups and pages on Facebook. ● Tips and guides for effective posts, paid promotions, and contests. ● In-depth exploration of Facebook Ads, Ad Manager, Power Editor, and targeting strategies. ● Utilizing Facebook tabs, apps, and understanding Facebook Page Insights. **Twitter, LinkedIn, Pinterest** ● Twitter setup, usage tips, and terminology. ● LinkedIn profile review and usage guides. ● Pinterest setup and management strategies.	**15**
II	**YouTube Video and Mobile Advertising** **YouTube Channel Management** ● Setting up a YouTube channel. ● Content management and optimization. ● Practical examples and strategies for effective channel management. **Video and Mobile Advertising** ● Importance of YouTube in marketing. ● YouTube formats, tools, and targeting. ● Video campaign creation, tracking, optimization, and analytics.	**15**

	● Mobile advertising: Key objectives, ad formats, networks, site, and app considerations. **Social Media Marketing Strategy** ● Introduction to Social Media Marketing Strategy ● Audience Identification and Persona Development ● Platform Selection and Planning ● Content Creation and Calendar Management ● Paid Advertising Strategies ● Monitoring and Analytics	
III	**Introduction to Analytics Tools** ● Overview of Social Media Analytics ● Importance of Analytics in Social Media Marketing ● Understanding key metrics (engagement, reach, impressions) ● Defining Key Performance Indicators (KPIs) for social media ● Setting SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) goals for social media campaigns **Introduction to Facebook Analytics and Instagram Insights** ● Connecting Instagram Business Account to Facebook ● Accessing Facebook Analytics and Instagram Insights ● Understanding Key Metrics on Facebook and Instagram ● Engagement Metrics (Likes, Comments, Shares) ● Reach and Impressions ● Click-Through Rates (CTR) and Conversion Metrics **Hootsuite Analytics** ● Hootsuite Analytics Overview ● Exploring Hootsuite Reports: Overview, Engagement, Trends ● Social Listening with Hootsuite	**15**
IV	**Practical** Students are expected to have a valid account of following social media platforms: Google, YouTube, Facebook, Twitter, Pinterest, LinkedIn, Hootsuite	**(30)**
Week 1 & week 2	**Comparison of Social Media Platforms:** Analyze and compare different social media platforms, outlining their unique features, target demographics, and potential for marketing **Information Aggregator Implementation:** Set up an account on an information aggregator (e.g., Feedly) and curate relevant content for a specific industry or topic.	**04**
Week 3 & Week 4	**Facebook & Instagram Marketing Campaign:** Plan and execute a marketing campaign on Facebook and Instagram, including creating engaging posts, running paid promotions, and analyzing results using insights.	**04**

Week 5 & Week 6	**Twitter, LinkedIn, Pinterest Optimization:** Optimize profiles on Twitter, LinkedIn, and Pinterest based on best practices.	**04**
Week 7 & Week 8	**Pinterest Board Creation and Optimization:** Create a Pinterest board for a specific business or topic, optimize it with relevant content, and implement strategies to enhance visibility.	**04**
Week 9 & Week 10	**YouTube Channel Creation:** Create a YouTube channel, upload a video, and optimize the channel for visibility. Discuss strategies for managing content effectively.	**04**
Week 11 & Week 12	**Mobile Advertising Campaign:** Develop and run a mobile advertising campaign, considering key objectives, ad formats, and targeting options. Evaluate the campaign's performance on both mobile sites and apps. **Social Media Marketing Strategy Development:** Develop a comprehensive social media marketing strategy, including audience identification, platform selection, content planning, and paid advertising strategies.	**04**
Week 13 & Week 14	**Social Media Analytics Application:** Use analytics tools (e.g., Facebook) to analyze key metrics for a social media campaign. Evaluate the effectiveness of the campaign and propose improvements. **Instagram Business Account Integration:** Connect an Instagram Business Account to Facebook, explore analytics, and analyze key engagement metrics.	**04**
Week 15	**Hootsuite Analytics Practice:** Explore Hootsuite Analytics features, generate reports on engagement and trends, and demonstrate social listening capabilities.	**02**
Pedagogy:	• Course delivery pattern, evaluation scheme, prerequisite shall be discussed at the beginning. • Conduct group activities to encourage collaboration and the exchange of ideas among students. • Practical Hands-On Sessions • Assign practical tasks related to creating and managing social media accounts, running campaigns, and analyzing results.	
References/ Readings:	**Main Reading:** 1. Dave Chaffey & Fiona Ellis-Chadwick, Digital Marketing: Strategy,Implementation and Practice, Pearson Education 2. Linda Coles Adams Media (2015). *Marketing with Social Media.* Adams Media. First Edition. 3. Sameer Deshpande, Nancy R. Lee. (2013). *Social Marketing in India.* Sage Response. First Edition. **Additional Reading:**	

	1. Dan Zarrella, (2009). *The Social Media Marketing Book.* O'Reilly. First Edition. 2. Lon Safko, The Social Media Bible: Tactics, Tools, & Strategies for Business Success, Brilliance Audio; Unabridged edition
Course Outcomes:	**On completion of the course, students will be able to:** 1. Understand social media marketing and analytics, the various channels through which it operates, and its role in marketing strategy. 2. Develop effective ways of creating social media marketing strategy 3. Analyze a Video Marketing Strategy and learn YouTube Advertising. 4. Design Facebook Ads and Instagram Ads and understand how to effectively brand their Social Media Pages.

Name of the Programme: Bachelor of Computer Applications
Course Code: CSA 323
Title of the Course: E- Commerce Applications
Number of Credits: 4 (3T +1P)
From AY: 2024-25

Pre-requisites For the Course:	None	
Course Objectives:	1. To understand the basic concept of e-commerce 2. To develop an understanding of Web-based Commerce 3. To understand marketing strategies for an online business 4. To equip students to assess e-commerce requirements of a business	
Units	**Content**	**No of hours 75 (45T+30P)**
I	**Introduction to Electronic Commerce and Application of E-commerce** • Meaning, Nature and scope of e-commerce, History of e-commerce, Business applications of e-commerce, E-Commerce Models: - (B2B, B2C, C2C, B2G), Advantages and Disadvantages of e-commerce, Applications of M-Commerce E-Commerce Web-sites as marketplace, Role of web site in B2C e-commerce, Web site design principles, Alternative methods of customer communication such as e-mail. • Applications of E-commerce Applications of e-commerce to Supply chain management Applications of e-commerce to Customer Relationship Management, Product and service digitization, Remote servicing	**15**
II	**Online Marketing and Business to Consumer E-Commerce Applications** • Online marketing and advertising, Push and pull approaches, Web counters, Web advertisements, Content marketing, Need of Digital Marketing for an e-commerce Business, Search Engine Optimization (SEO), Search Engine Marketing (SEM), Social Media Marketing (SMM), Web Analytics • Cataloging, Order planning and order generation, Cost estimation and pricing, Order receipt and accounting, Order selection and prioritization, Order scheduling, Order fulfilling, Order delivery, Order billing, Post sales service	**15**

III	**Business to Business E-Commerce , Electronic Payment System and Security Issues in E-Commerce** • Need and Models of B2B e-commerce, Using public and private computer networks for B2B trading; EDI and paperless trading, Characteristic features of EDI service arrangement, EDI architecture and standards, Reasons for slow acceptability of EDI , Value Added Networks • Types of payment systems, credit cards, debit cards, mobile wallets, Electronic Fund Transfer (EFT), Operational credit and legal risk of e-payment, Risk management options for e-payment systems • Risks of e-commerce, Types and sources of threats to e-commerce ; Protecting electronic commerce assets and intellectual property, Firewalls, Client server network security, Security tools, Digital identity and electronic signature; Risk management approach to e-commerce security	**15**
IV	**Practical Work.**	**30 Hours**
Week 1 & Week 2	• Case study to understand e commerce model • Practical on understanding the process of registering a business on the marketplace, listing your catalog.	**4**
Week 3 & Week 4	• Implement retargeting techniques.	**4**
Week 5 to Week 7	• Understanding implementing email advertising. • Understanding and implementing video advertisement, reels, story creation and other visual advertisement strategies.	**6**
Week 8 & Week 9	• Use different Tools for SEO (on page and off page) • Case study on different tools	**4**
Week 10 & Week 11	• Implement different types of Content marketing strategies.	**4**
Week 12 & Week 13	• Use Social media marketing platforms to market the products e.g. : facebook, LinkedIn, Instagram	**4**
Week 14 & Week 15	• Practical to use Web analytics tools e.g. Google Analytics, crazy egg • Implementing online payment for a website. • Case study on EDI model and understand various EDI message passing.	**4**

Pedagogy:	**Suggested strategies for use to accelerate the attainment of the various course outcomes.** 1. Lecture methods need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. 2. Lectures preferably to be conducted with the aid of multimedia projector, black board, group activities, charts, cases, etc. 3. Use of Case studies to illustrate concepts of Ecommerce 4. Introduce Topics in manifold representations. 5. Discuss how every concept is applied to the real world products 6. Assignment based on the course content may be given to the students to evaluate how learning of objectives was achieved.
References/ Readings:	**Main Reading:** 1. Agarwala, Kales N., Amity All Deeksha Agarwala (2000). *Business on the Net: An Introduction to the Whats and Hows of ECommerce.* Macmillan India Ltd. 2. Diwan, Prag and Sunil Sharma(2002). *Electronic Commerce- A Manager's Guide to EBusiness.* Vanity Books International Delhi. 3. Fitzerald (1998). *Business Data Communication Network.* McGraw Hill. **Additional Reading:** 1. Praveen Iyer (2020). *Electronic Data Interchange - edi made simple* Paperback
Course Outcomes :	**On completion of the course, students will be able to** 1. Recall the basics of e-commerce. 2. Understand the design principles of e-commerce websites and different models of e-commerce. 3. Apply the marketing strategies for an online business 4. Analyze the modern ways of doing e-commerce and threats to e-commerce

Name of the Programme : Bachelor of Computer Applications
Course Code : CSA-324
Title of the Course : Modern Frameworks
Number of Credits : 4(3T + 1P)
Effective from AY : 2023-24

Pre-requisite for the Course:	Knowledge of web designing using HTML, CSS, JavaScript, fundamentals of web application development and database queries.	
Course Objectives:	1. To understand the Fundamentals of Modern Frameworks 2. To design modern web interfaces using Tailwind CSS and VueJS 3. To explore NoSQL Database Management with MongoDB 4. To Build a simple web application using Tailwind CSS, VueJS and MongoDB	
Units	**Content**	**No of hours 75 (45T + 30P)**
I	**Fundamentals of Modern Frameworks** • Introduction to modern frameworks • Types of framework architectures - monolithic, microservices, serverless, three-tier, Model–view–controller (MVC), Client-side and Server-side features. **Microservice Architecture** • Microservice Characteristics • Understanding Microservices • Microservice Architecture • Adopting Microservices • Issues with monolithic architecture • REST Architecture principles • Microservice Transaction Management.	**10**
II	**Tailwind CSS Framework** Introduction to utility-first CSS framework • Features of Tailwind CSS • Tailwind CSS installation with CLI • @tailwind directive • CSS layout • CSS Flexbox • CSS Grid • CSS effects and filters • CSS Transitions and Animation • CSS Transforms • CSS Interactivity **VueJS Framework** • Introduction to Vue.js • Advantages of using Vue.js • Understanding the Vue.js ecosystem • Setting up a development environment	**20**

	• Virtual DOM • Data Binding • Understanding Vue instance and data • Vue directives and event handling • Conditional rendering and loops • Vue components and props • Routing with Vue Router • Creating and managing forms • Handling user input with v-model • Validating form data • Consuming APIs with Vue.js	
III	**Introduction to NoSQL Database** • NoSQL Databases • Difference between RDBMS and NoSQL • Benefits of NoSQL • JSON Introduction • JSON Structure **Introduction to MongoDB** • History of MongoDB, • Node Packaged Modules (npm), Installing MongoDB Locally, The Mongo Shell- Shell Collection Methods, MongoDB Database Commands **MongoDB query language** • CRUD (Creating, Reading & Updating Data) Mongo Shell • Query Operators • Update Operators and a Few Commands • Aggregation pipeline • Map-Reduce **MongoDB Cloud** • MongoDB Atlas (or any other platform) • The Developer Data Platform • Creating and Deploying an Cluster (Atlas or any other)	**15**
IV	**Practical Work**	**30**
Week 1 & week 2	• **Setting up a Tailwind CSS Project** In this exercise, create a new web project and set up Tailwind CSS using the CLI. Utilize the @tailwind directive to integrate Tailwind into your HTML file and demonstrate basic utility-first styling principles. • **Building Responsive Layouts with Tailwind CSS** Design a responsive web page layout using Tailwind CSS, incorporating Flexbox and Grid to create a visually appealing and adaptive interface suitable for various screen sizes.	**04**
Week 3 & week 4	• **Implementing CSS Transitions and Animation with Tailwind** Enhance user experience by adding smooth transitions and animations to different elements of your webpage using	**04**

	Tailwind CSS. Experiment with various transition and animation classes provided by Tailwind. • **Introduction to Vue.js and Vue Instance** Set up a Vue.js project, create a Vue instance, and explore the basics of data binding. Display dynamic content on the webpage by manipulating data properties within the Vue instance.	
Week 5 & week 6	• **Vue.js Directives and Event Handling** Implement Vue directives such as v-bind and v-on to handle events and dynamically update the DOM. Create interactive elements that respond to user actions through Vue.js. • **Routing with Vue Router** Integrate Vue Router into your Vue.js project to enable navigation between different views or pages. Define routes, create navigation links, and demonstrate the seamless transition between components.	**04**
Week 7 to week 9	• **Creating Vue.js Components and Props** Build modular and reusable components in Vue.js, passing data between them using props. Create a simple application with multiple components to demonstrate the power of Vue.js components. • **Form Handling and Validation in Vue.js** Develop a form in Vue.js, implement two-way data binding using v-model, and introduce form validation techniques. Ensure that user input is processed and validated effectively within the Vue.js framework. • **Consuming APIs with Vue.js** Fetch data from an external API using Vue.js and display it dynamically on your webpage. Explore the lifecycle hooks provided by Vue.js to manage the API request and response cycle.	**06**
Week 10 & week 11	• **Introduction to NoSQL and JSON** Understand the basics of NoSQL databases and JSON data structure. Create a sample JSON document. • **MongoDB CRUD Operations** Install MongoDB locally, interact with the Mongo Shell, and perform CRUD operations (Create, Read, Update, Delete) on a MongoDB database. Practice inserting, querying, updating, and deleting documents. ● **MongoDB Query Operators** Explore various query operators in MongoDB, such as $eq, $gt, $lt, etc. Build queries that retrieve specific data from a collection based on different criteria using these operators.	**04**

Week 12	● **Aggregation Pipeline in MongoDB** Dive into MongoDB's aggregation pipeline and construct complex queries that involve stages like $match, $group, $sort, and $project. Understand how to perform data transformations and aggregations in MongoDB. ● **MongoDB Cloud Platform (Atlas or any other)** Sign up for the platform, create a new cluster, and deploy it. Configure the connection to your local MongoDB instance and explore the features provided by MongoDB cloud platform for managing databases in the cloud. Explore features of MongoDB cloud platform, such as data backups, scaling, and monitoring.	**02**
Week 13 to week 15	● **Building a Web Application** Create a simple web application integrating Tailwind CSS for styling, Vue.js for dynamic web interface, and MongoDB cloud platform for cloud data storage.	**06**
Pedagogy:	**Suggested strategies for use to accelerate the attainment of the various course outcomes.** 1. The lecture method need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. You may use a. Video/Animation to explain various concepts. b. Collaborative, Peer, Flipped Learning, etc. 2. Ask at least three HOT (Higher-Order Thinking) questions in the class, which promotes critical thinking. 3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, and develops design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it. 4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding 6. To promote self-learning, give at least one assignment where they can complete one MOOCs (certificate or equivalent) course out of lecture hour. Test their understanding through quizzes or presentations.	
References/ Readings:	**Main Reading** 1. Callum Macrae (2018). *Vue.js: Up and Running.* O'Reilly Publication. 2. Kristina Chodorow (2014). *MongoDB – The Definitive Guide (2nd Edition).* O'Reilly Publication 3. Noel Rappin (2021). *Modern CSS with Tailwind: Flexible Styling without the Fuss. ISBN-13: 978-1680508185.* The Pragmatic Programmers Publication. **Additional Reading** 1. Nicholas Cloud (2019). JavaScript Frameworks for Modern Web Development. APRESS Publication. 2. Sam Newman(2021). Building Microservices: Designing Fine-grained	

	Systems(2nd Edition). O'Reilly Publication
Course Outcomes:	**On completion of the course, students will be able to:** 1. Understand modern framework fundamental concepts. 2. Apply Tailwind CSS for Stylish Web Design and VueJS for creatingmodern web interfaces. 3. Manage Data Effectively with NoSQL database MongoDB. 4. Design web applications using Tailwind CSS, VueJS and MongoDB.