SEMESTER - V

Branch: BCA	Semester-V
Subject Code: 5101	Lecture: 04 Credit: 04
Course Opted	Core Course – 15
Subject Title	MOBILE APPLICATION

Course Objectives:

- Understand the application development lifecycle.
- Develop a grasp of the Android OS architecture.
- Create an android based mobile application
- Familiarize with Android's APIs for data storage, retrieval, user preferences, files and content providers
- Experiment with database to store data locally
- Identity, analyze and choose tools for Android development including device emulator, profiling tools and IDE

Course Outcomes:

- Recognizes mobile development environments...
- Write clear and effective Android code.
- Create Native & Hybrid Mobile applications using Android App Development
- Implementing database using SQLite & Firebase Real-time Database.
- Be exposed to technology and business trends impacting mobile application
- Be competent with designing and developing mobile applications using one application development framework.

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weightage %
UNIT-I	1	**Programming Revision (Object Oriented Programming Concepts & Java Fundamental):** Class, Object & methods, Constructors in Java, Inheritance, Polymorphism, Abstraction, Encapsulation, Exception Handling in Java, Multithreading in Java, File I/O **Introduction to Android Programming Language:** What is Android, History and Version, Software Stack, Core Building Blocks, Android Emulator, Hello Android example, Internal Details, Dalvik VM, AndroidManifest.xml	8	16
	2	**Android Application Layout:** Android Linear Layout, Android Relative Layout, Android Table Layout, Scroll View in Android, Android Frame Layout	8	12
UNIT-II	3	**Android Activity & Intent, Android Fragments:** Activity Lifecycle, Implicit Intent, Explicit Intent, Android Fragments	8	12
	4	**Android UI widgets:** Working with Button, Toast, Toggle Button, Checkbox, Image View, Image Button, Alert Dialog, Spinner, AutoComplete Text View, Rating Bar, Date Picker, Date Picker, Time Picker, Progress Bar	10	24
	5	**Building Android Application with Web View:** Building Simple Web View Application, Load	4	8

		HTML Date on Web View, Embed/Display YouTube Video in Web View, Convert Custom Design Website into Android App.		
UNIT-III	6	**Menus in Android & Services:** Option Menu, Context Menu, Popup Menu, It can be used to perform any task in background. It doesn't have any user interface (UI).	2	4
	7	**Android Database (SQLite) & Android Multimedia:** SQLite Example with GUI, Fire Base (Real time), Playing Audio in android Example, Playing Video in android Example, Playing Media Player in android Example.	2	4
	8	**Android Speech & Telephony API:** Speech API is used to convert text into speech, Text to Speech Example with Speed option, Telephony Manager, Get Call State, Call State Broadcast Receiver, How to make a Phone Call, How to Send SMS, How to Send Email.	4	8
UNIT-VI	9	**Device Connectivity &Android sensor:** Bluetooth, List Paired Device, Wi-Fi, Android Sensor.	2	4
	10	**Android Material Design Using Design Support Library & Animation:** Navigation Drawer View, Splash Screen, Android animation enables you to rotate, slide and flip images and text, Fade In Animation in Android, Fade Out Animation in Android, Zoom In Animation in Android, Zoom Out Animation in Android, Implementing Ripple Effect in Android, Add Ripple Effect/Animation to a Android Button.	2	8
TOTAL			**50**	**100**

Text Book:

1. Android Studio 3.0 Development Essentials

Reference Books:

1. Android Programming: The Big Nerd Ranch Guide
2. Android Application Development - Black book
3. Android Development for Gifted Primates
4. Android Cookbook focuses
5. Practical Android
6. Head First Android: A Brain-Friendly Guide, by Paul Barry.

Branch: BCA	Semester-V
Subject Code: 5201	Lecture: 02 Credit: 02
Course Opted	Core Course Lab– 15
Subject Title	MOBILE (ANDROID) APPLICATION LAB

Course Objectives:

- Install and run the Android studio & JDK 1.8
- Gain knowledge of Android syntax
- The student will learn the basics of Android platform and get to understand the application lifecycle
- Android programming wherein students will be able equipped with skills for analyzing, designing, developing and troubleshooting java applications.
- Students understand the operation of the application, application lifecycle, configuration files, intents, and activities.

Course Outcomes:

- Build and deploy his/ her Android application.
- The candidates get a better understanding of the UI - components, layouts, event handling, and screen orientation.
- Students also develop a working knowledge of the custom UI elements and positioning.
- The candidates may also have an in-depth understanding of broadcast receivers and services.

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weightage %
UNIT- I	1	**Installation of Android studio & JDK 1.8:** Java program to perform example of Class, Object & methods, Java program to perform Example of Constructors in Java, Java program to perform Example of Inheritance, Write a java program to perform Example of Polymorphism, Java program to perform Example of Abstraction, Java program to perform Example of Encapsulation, Java program to perform Example of Exception Handling in Java , Java program to perform Example of Multithreading in Java, Java program to perform Example of File I/O, Android Program to Build a Simple Android Application, Android Program to Demonstrate Usage of String.xml File, Java Android Program to Change the Background of Your Activity, Android Program to Demonstrate Action Button by Implementing on Click Listener (Use Intent).	4	8
	2	Android Program to Demonstrate the use of Scroll View, Android Program to Demonstrate the use of Liner Layout, Android Program to Demonstrate the use of Relative Layout, Android Program to Demonstrate the use of Table Layout.	4	4
	3	Android Program to Create Multiple Activities within an Application, Android Program to Demonstrate	2	4

		Explicit Intent, Android Program to Demonstrate Implicit Intent.		
UNIT- II	4	**Android Program to perform all Operations using Calculators:** Android Program to Demonstrate Alert Dialog Box, Android Program to Demonstrate Toast in an Application, Android Program to Demonstrate the use of Checkbox, Android Program to Demonstrate the use of Image Button, Android Program to Demonstrate the use of Image View, Android Program to Demonstrate the use of Spinner, Android Program to Demonstrate the use of Rating bar.	4	8
	5	Android Program to Demonstrate the Building Simple Web View Application, Android Program to Demonstrate the Load HTML Date on Web View, Android Program to Demonstrate the Embed/Display YouTube Video in Web View, Android Program to Demonstrate the Convert Custom Design Website into Android App.	2	8
UNIT-III	6	Android Program to Demonstrate the Option Menu, Android Program to Demonstrate the Context Menu, Android Program to Demonstrate the Popup Menu, Android Program to Demonstrate the It can be used to perform any task in background. It doesn't have any user interface (UI).	2	4
	7	Android Program to Demonstrate the SQLite Example with GUI, Android Program to Demonstrate the FireBase (real time), Android Program to Demonstrate the Playing Audio in android Example, Android Program to Demonstrate the Playing Video in android Example, Android Program to Demonstrate the Playing Media Player in android Example.	2	2
	8	Android Program to Demonstrate the Speech API is used to convert text into speech, Android Program to Demonstrate the TextToSpeech Example with Speed option, Android Program to Demonstrate the Telephony Manager, Android Program to Demonstrate the Get Call State, Android Program to Demonstrate the Call State Broadcast Receiver, Android Program to Demonstrate the How to make a Phone Call, Android Program to Demonstrate the How to Send SMS, Android Program to Demonstrate the How to Send Email.	2	4
	9	Android Program to Demonstrate the Bluetooth, Android Program to Demonstrate the List Paired	1	4

UNIT-IV		Device, Android Program to Demonstrate the Wi-Fi, Android Program to Demonstrate the Android Sensor.		
	10	Android Program to Demonstrate the Navigation Drawer View, Android Program to Demonstrate the Splash Screen, Android Program to Demonstrate the Android animation enables you to rotate, slide and flip images andtext, Android Program to Demonstrate the Fade In Animation in Android, Android Program to Demonstrate the Fade Out Animation in Android, Android Program to Demonstrate the Zoom In Animation in Android Android Program to Demonstrate the Zoom Out Animation in Android, Android Program to Demonstrate the Implementing Ripple Effect in Android, Android Program to Demonstrate the Add Ripple Effect/Animation to a Android Button.	2	4
TOTAL			**25**	**50**

Text Book:

1. Android Studio 3.0 Development Essentials

Reference Books:

1. Android Programming: The Big Nerd Ranch Guide
2. Android Application Development - Black book
3. Android Development for Gifted Primates
4. Android Cookbook focuses
5. Practical Android
6. Head First Android: A Brain-Friendly Guide, by Paul Barry.

Branch: BCA	Semester-V
Subject Code: 5102	Lecture: 04 Credit: 04
Course Opted	Core Course – 16
Subject Title	ARTIFICIAL INTELLIGENCE

Course Objectives:

- To understand the basic principles, techniques, and applications of Artificial Intelligence.
- To understand the historical perspective of AI and its foundations.
- To understand a basic understanding of the building blocks of AI.
- To understand intelligent agents: Search, Knowledge representation, inference, logic, and learning.

Course Outcomes:

- Students will be able to demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
- Students will be able to understand the fundamentals of various applications of AI techniques in intelligent agents, expert systems models.

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weightage %
UNIT-I	1	**Introduction:** History and Application of AI, AI Techniques, Types, Intelligent Agent: Types, Environment, Solving problems by searching-Toy problems, Real-World problems, 8 puzzle game, chess-board problem, tic-tac toe, Water-jug Problem, Travelling salesman Problem, The wampus world Problem.	12	24
UNIT-II	2	**Informed Search Strategies:** Greedy best first search, A* algorithm, Heuristic function, Games: Single player and multiplayer game. The minimax strategy, Maximin Strategy, Alpha Beta Pruning and cut-off.	6	12
	3	**Uniformed Search Strategies**: Breadth-first search, Depth-first search, Comparing uniformed search techniques. Informed search strategies: Generate-and-test, Hill climbing, Best-first search, problem reduction, constraint satisfaction, Mean-ends analysis.	8	16
UNIT-III	4	**Knowledge Representation**: Issues in knowledge representation, Approaches to knowledge representation, introduction to ontology Logic and Inferences: Formal logic, history of logic and knowledge, propositional logic, resolution method in propositional logic.	6	12

UNIT-IV	5	**Expert System:** Knowledge acquisition methods, knowledge engineering process, goals in knowledge system development, basic architecture of expert system, problem domain versus knowledge domain, Development of ES and life cycle of ES. Advantages of expert system, structure of Rule based expert system, characteristics of conventional system and expert system.	10	20
	6	**Statistical Reasoning:** Probability and Bayes theorem, Certainty factor, Dempster-Shafer theory, Fuzzy logic: crisp sets, application of fuzzy logic.	8	16
TOTAL			**50**	**100**

Text Book:

1. Artificial Intelligence (Third Edition) McGraw-Hill Elaine Rich, Kevin Knight.

Reference Books:

1. A First course in Artificial Intelligence (McGraw-Hill) Deepak Khemani.
2. Artificial Intelligence A modern approach (Second Edition) Pearson, Stuart Russell, and Peter Norvig.
3. Fuzzy Logic with Engineering application (Third edition) Timothy J. Rose.
4. Artificial Intelligence and Intelligence system: N. P. Padhy
5. Artificial Intelligence: Patrick Henry Winston
6. Artificial Intelligence (Structure & Strategies for Complex Problem solving): George F. Luger

Branch: BCA	Semester-V
Subject Code: 5103	Lecture: 04 Credit: 04
Course Opted	Core Course – 17
Subject Title	CYBER SECURITY

Course Objectives:

- The learner will gain knowledge about protect personal data, and secure computer networks.
- The learner will be able to examine secure software and wed security. The learner will be able to find solution to the key distribution problem by using functional key pair; public key cryptography
- The learner will develop an understanding of security policies (such as confidentiality, integrity, and availability), as well as protocols to implement such policies.
- The learner will be able to examine certain attacks on networks and security related services.

Course Outcomes:

The student will

- Understand the basic security principals
- Understand the concepts of data confidentiality security concern and its solution through cryptography
- Be able to verify identity through various authentication mechanisms
- Learn about Safeguarding the network at the network layer
- Learn about attacks on the networks and security related services

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weightage %
UNIT-I	1	**Introduction to Cyber Security:** Introduction to Cyber Security, History, Goals, Need of Security, Principles, Elements, Type of Cyber Attacks, Security Policies, Security Techniques, Steps for Better Security, Basics Security Terminology (Cryptography, Hacking, Encryption, Decryption)	6	12
	2	**Data Encryption techniques:** Introduction: Encryption Methods (Symmetric Encryption & Asymmetric Encryption), Cypotography. **Subsitution Ciphers:** Ceaser, Monoalphabetic, Playfair, Hill, Polyalphabetic, One-tine Pad or Vernam. **Transposition Ciphers:** Single Columnar, Double Columnar. Cyptanalysis, Steganograhy. **Data Encryption Standards:** Working of DES, Cracking of DES, Simplified Data Encryption Standards. **Symmetric Ciphers:** Introduction, Blowfish Architecture, RC5, RC4, RC6, Comparison between	6	12

		RC6 and RC5, IDEA (International Data Encryption Algorithm)		
UNIT-II	3	**Public Key Cryptosystems:** Introduction, Public Key Cryptography, RSA Algorithm (Working of RSA, Key length and Security) **Authentication:** Introduction, Authentications Methods(Password-based, Two-factor, Biometric, Extensible). **Kerberos:** Basics, Ticket Granting Approach, Public Key Cryptography, Advantges, Weakness and attacks, Applications and Limitations, Comparison of Kerberos with SSL, Authentication Servers	6	12
	4	**Digital Signatures:** Introduction, Implementation, Association of Digital Signatures and Encryption, Using Different Key pairs for Signing and Encryption. **Algorithms for Digital Signature:** DSA(Digital Signature Algorithm, ECDSA(Elliptic Curve Digital Signature Algorithm), DSS, Attacks on Digital Signature. **Electronic Mail Security:** Introduction, Pretty Good Privacy (PGP), MIME, S/MIME, Comparison of PGP and S/MIME. **IP Security:** Introduction, IP Security Architecture, IPv6, IPsec, IPv4 and IPv6, IPsec Protocols and Operations **Web Security:** Introduction, SSL, SSL Session and Connection, SSL Record Protocol, Secure Electronic Transaction.	7	14
UNIT-III	5	**Intrusions:** Introduction, Intrusion Detection, Intrusion Detection System, Password Management Practices, Limitations, Challenges **Malicious Software:** Introduction, Malicious Code, Viruses, Worms, Trojans, Spyware, Ransom ware, Bots, Best Practices, Attacks	6	12
	6	**Firewall:** Introduction, Characteristics, Types, Benefits and Limitations, Architecture, **Cyber Laws:** Introduction, Cyber Security Regulations, Role of International Law, Cyber Security Standards, Indian Cyber Space, National Cyber Security Policies.	6	12
UNIT-IV	7	**Digital Forensic:** Introduction to cyber crimes & Digital Forensic, Types of Digital Forensics, Digital Forensics Process, Areas of Application of computer forensics, Understanding the Suspects, Examples of Computer Forensics, Free space and Slack Space.	6	12

	8	**Case Studies on Cryptography and security:** Cryptographic Solutions, SSO, Secure inter-branch Payment Transactions, Denial of Service (DOS) attacks, IP Spoofing attacks, CSSV, secrete splitting, Contract signing.	7	14
TOTAL			**50**	**100**

Text Book:

1. Atul Kahate, Cryptography and Network Security, McGraw Hill

Reference Books:

1. Cybersecurity Fundamentals: A Real-World Perspective
2. CRYPTOGRAPHY AND INFORMATION SECURITY, THIRD EDITION, PACHGHARE, V. K. Eastern Economy Edition, 2019.
3. Kaufman, C., Perlman, R. & Speciner, M., Network Security, Private Communication in a Public world, 2nd ed., Prentice Hall PTR, 2002
4. Stallings, W., Cryptography and Network Security: Principles and Practice, 3rd ed., Prentice Hall PTR., 2003.
5. Stallings, W., Network Security Essentials: Applications and Standards, Prentice Hall, 2000
6. A Course in Cryptography, By Heiko Knospe, The Sally Series, AMS.

Branch: BCA	Semester-V
Subject Code: 5104	Lecture: 02 Credit: 02
Course Opted	Skill Enhancement Course-3
Subject Title	MULTIMEDIA AND APPLICATION

Course Objectives:

- To learn and understand technical aspect of Multimedia Systems.
- To understand the standards available for colour model and different images, video and text applications.
- To Design and develop various Multimedia Systems applicable in real time
- To learn various multimedia authoring systems, computer graphics used for multimedia applications and Display devices.
- To understand Video signal formats and TV broadcasting system.

Course Outcomes:

- Learner will Developed understanding of technical aspect of Multimedia Systems.
- Learner will understand various file formats for images, video, text media, colour models and software tools.
- Learner will develop various Multimedia Systems applicable in real time with action script.
- Learner will design interactive multimedia softwareprogram multimedia data and be able to design and implement media applications.
- Learner will understand different graphics algorithm, Display devices, Video signal formats and TV broadcasting system.

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weightage %
UNIT- I	1	**Fundamental concept of multimedia:** An overview of multimedia, Multimedia presentation and production, multiple media, Hardware-software requirement, uses of multimedia, steps for creating multimedia presentation. **Graphics & Image Data Representations:** Graphics/Image Data types: 1 Bit Image, 8 Bit Gray level Image, Image Data types, 24-Bit color images, Higher-Bit-Depth Images, 8-Bit color Image, color Lookup Tables. **Popular File Formats:** GIF, JPEG, PNG, TIFF, Windows BMP, Windows WMF, Netpbm format, EXIF.	12	24
UNIT- II	2	**Color in Image & Video:** Color Science & Color Models in Image Color, Models in Video. **Fundamental Concepts in Video:** Analog Video, Digital Video, Video Display Interfaces, 3D Video and TV **Basics of Digital Audio:** Digitization of Sound, MIDI. **Multimedia Anchoring:**	13	26

		Basic Concepts, Anchoring Tools, Macromedia Director Flash. **Multimedia Applications:** Media preparation, Media Editing, Integration: Interactive Services, Multimedia Distribution Services, Media Usage (Electronic Books & Magazines, Kiosks, Tele-shopping, Entertainment).		
TOTAL			**25**	**50**

Text Books:

1. Fundamentals of Multimedia by Ze- Nian Li and Mark S. Drew PHI/Pearson Education.
2. Principles of Multimedia by Ranjan Parekh (McGraw-Hill.
3. Multimedia Applications by Ralf Steinmetz, Klara Nahrstedt.
4. Multimedia: Computing Communications & Applications by Ralf Steinmetz

Reference Books:

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley- Dreamtech
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
3. Multimedia and communications Technology, Steve Heath, Elsevier(Focal Press).
4. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
5. Multimedia Basics by Weixel Thomson.
6. Multimedia Technology and Applications, David Hilman, Galgotia.
7. Multimedia System Design, P K Andleigh &Thakrar (PHI).
8. Advanced Graphics Programming in C & C++ By Roger.

Branch: BCA	Semester-V
Subject Code: 5105	Lecture: 04 Credit: 04
Course Opted	Discipline Specific Elective -1
Subject Title	MANAGEMENT INFORMATION SYSTEM

Course Objectives:

- Understand the Management Information concept with role of management in an organization.
- Explain relationships between concepts of information systems, organization, management and strategy.
- Explain managerial activities and roles with decision making process.
- Understand MIS concepts working in development stages through various case studies.

Course Outcomes:

- Enable Learners to describe the role of information technology and information systems in business and analyze how information technology impacts a firm.
- It is help learners to interpret how to use information technology to solve business problems.
- Analyze the relationship between information systems and organizations.
- Describe how managers make decisions in organizations.
- Evaluate the role of information systems in supporting various levels of business strategy.

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weightage %
UNIT-I	1	**Management Information System in Digital Firm:- Introduction to MIS:** MIS concept, definition, role of MIS, Impact, MIS and the User, MIS effectiveness, MIS for a Digital Firm.	5	10
	2	**E-Business Enterprise:** Introduction, organization of business in Digital Firm, e-business, e-commerce, e-communication, e-collaboration, real-times enterprise, Technology used in RTE (Real Time Enterprise).	6	12
UNIT-II	3	**Basic of Management Information System:- Decision Making:** Decision making concept, decision making process, MIS and decision making, Decision Analysis by Analytical Modelling, Behavioural concepts in DM, organizational DM.	7	14
	4	**Information Concepts:** Information concept, information - a quality product, classification of information, methods of data and information collection, value of information, general model, MIS and Information.	5	10
	5	**System Engineering:** System concept, types of systems, general model of MIS, need for system analysis, system analysis of existing system, system analysis of new requirement, system development model, computer system design.	7	14

UNIT-III	6	**Development of MIS:** Long range plans of MIS, Development and implementation of MIS.	5	10
	7	**Business Intelligence for MIS:** BI & MIS, tools & techniques of BI, BI Development, BI used, process of generation of BI.	5	10
UNIT-IV	8	**Applications of MIS to e-Business:** Applications in manufacturing sector / Service Sector/DSS & KM /Management of global Enterprise.	5	10
	9	**Comprehensive Cases in MIS.**	5	10
TOTAL			**50**	**100**

Text Book:

1. W.S. Jawadekar, “Management Information Systems, Text and Cases: A global Digital Enterprise” Tata McGraw Hill Publishing, 2013.

References Books:

1. V. Rajaraman, “Analysis & Design of Information System,” PHI.
2. J. Kanter, “Management/Information Systems”, PHI, 1996
3. Gordon B. Davis & M.H. Olson, “Management Information Systems: Conceptual Foundation, structure and Development” 1984.
4. MIS Managerial Perspective (2e) -D.P Goyal ; MacMillan
5. MIS practices in the new millenium-S. Shajahan.

Branch: BCA	Semester-V
Subject Code: 5105	Lecture: 04 Credit: 04
Course Opted	Discipline Specific Elective -2
Subject Title	SEARCH ENGINE OPTIMIZATION

Course Objectives:

- To optimize a website involving editing its content, adding content, doing HTML, and associated coding to both increase its relevance to specific keywords and to remove barriers to the indexing activities of search engines.
- To learn to promote a site to increase the number of back links, or inbound links, is another SEO tactic.
- To explore the legal relationships among the various industries.

Course Outcomes:

- To remember and learn the practical aspects of Search Engine Optimization.
- To understand and learn how to promote sites.
- To Apply and differentiate the concept of back links or inbound links.
- To Create and develop the technical skills related to digital marketing activities.

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weightage %
UNIT-I	1	Introduction to SEO, Types of SEO (White Hat, Red Hat) and techniques, How Search Engine Work?, Domain. **Research and Analysis:** Marketing Research, keyword research and Analysis, competitor's website, choosing best keywords, tools available for keyword research) **SEO Guidelines:** Website Design guidelines, Content optimization, SEO Design and layout, XML Sitemap / URL List Sitemap.	6	12
	2	**On-page Optimization:** The Page Title, Meta Descriptions, Meta Keywords, Headings, Bold Text, Domain Names & Suggestions, Canonical Tag, Meta Tags, Images and Alt Text, Internal Link Building, The Sitemap, Invisible Text, Server and Hosting Check, Robots Meta Tag, Doorway Pages, 301 Redirects, 404 Error, Duplicate content.	7	14
UNIT-II	3	**Off-page Optimization:** Page Rank, Link Popularity, Link Building in Detail, Directory Submission, Social Bookmark Submission, Blog Submission, Articles, Links Exchange, Reciprocal Linking, Posting to Forums, Submission to Search Engine, RSS Feeds Submissions, Press Release Submissions, Forum Link Building, Competitor Link Analysis.	8	16

	4	**Analytics:** Google Analytics, Installing Google Analytics, How to Study Google Analytics, Interpreting Bars & Figures, How Google Analytics can Help SEO, Advanced Reporting, Webmaster Central, Bing/Yahoo, Open Site Explorer, Website Analysis using various SEO Tools available.	8	16
UNIT-III	5	**SEO Tools:** Keyword Density Analyzer Tools, Google Tools, Yahoo / Bing Tools, Rich Snippet Text Tool, Comparison Tool, Link Popularity Tools, Search Engines Tools, Site Tools, Miscellaneous Tools.	8	16
	6	**SEO Reporting:** Google analysis, Tracking and Reporting, Reports Submission, Securing Ranks.	6	12
UNIT-IV	7	**Optimizing Search Strategies:** Adding your site to Directories, Pay-for-inclusion services, robots, spiders and crawlers, adding social media optimization.	7	14
	8	**Mobile Search Engine Optimization:** Monetizing Traffic as an SEO Strategy, Plugging into to SEO, Automated optimization.		
TOTAL			**50**	**100**

Text Book:

1. Jerry L. Ledford, “SEO: Search Engine Optimization Bible”, John Wiley & Sons, 2007

References Books:

1. Todd Kelsey, “Introduction to Search Engine Optimization: A Guide for Absolute Beginners”, Apress Publication.
2. Bruce Clay, Susan Esparza, “Search Engine Optimization – All-in-one for Dummies”, John Wiley & Sons
3. Eric Enge, Stephan Spencer, Rand Fishkin, Jessie Strichhiola, “The Art of SEO: Mastering Search Engine Optimization”, O’Reilly Media Inc. Publication.

Branch: BCA	Semester-V
Subject Code: 5105	Lecture: 04 Credit: 04
Course Opted	Discipline Specific Elective -3
Subject Title	DATA ANALYSIS AND VISUALIZATION

Course Objectives:

- Conduct exploratory data analysis using visualization.
- Design and evaluate color palettes for visualization based on principles of perception.
- Apply data transformations such as aggregation and filtering for visualization.
- Identify opportunities for application of data visualization in various domains.
- Use JavaScript with D3.js to develop interactive visualizations for the Web.

Course Outcomes:

- Learner will be able to present data with visual representations for your target audience, task, and data.
- Learner will be able to Experiment with and compare different visualization tools;
- Learner will be able to Create multiple versions of digital visualizations using various software packages and also to identify appropriate data visualization techniques imposed by the data;
- Learner will be able to apply appropriate design principles in the creation of presentations and visualizations and also to analyze, critique, and revise data visualizations

Modules	Sr. No.	Topic and Details	No. of Lectures Assigned	Marks Weightage %
UNIT –I	1	**The role of statistics:** Graphical and numerical methods for describing and summarising data. Probability. Population distributions. Sampling variability and sampling distributions.	8	16
	2	**Estimation using a single sample:** Hypothesis testing a single sample. Comparing two populations or treatments. Simple linear regression and correlation.	6	12
UNIT –II	3	Overview of Data Visualization, Introduction to Web Technologies.	4	8
	4	Introduction to SVG , CSS, JavaScript, VizHub.	4	8
	5	**Data Abstraction, Task Abstraction:** Input for Visualization: Data and Tasks, Loading and Parsing Data with D3.js	4	8
UNIT -III	6	**Marks and channels:** Encoding Data with Marks and Channels, Rendering Marks and Channels with D3.js and SVG, Introduction to D3 Scales, Creating a Scatter Plot with D3.js	4	8

	7	**Arrange tables, Types of charts:** Reusable Dynamic Components using the General Update Pattern, Reusable Scatter Plot, Common Visualization Idioms with D3.js, Bar Chart, Vertical &Horizontal, Pie Chart and Coxcomb Plot, Line Chart, Area Chart.	6	12
UNIT -IV	8	**Arrange spatial data, Geographic data:** Isocontours, Arrange network and trees, Map colors and other channels Making Maps, Visualizing Trees and Networks, Encoding Data using Color, Encoding Data using Size, Stacked & Grouped Bar Chart, Stacked Area Chart &Streamgraph, Line Chart with Multiple Lines.	6	12
	9	**Manipulate view, Facet into multiple view:** Adding interaction with Unidirectional Data Flow, Using UI elements to control a scatter plot, Panning and Zooming on a Globe, Adding tooltips.	4	8
	10	**Reduce items and attributes:** Small Multiples, Linked Highlighting with Brushing, Linked Navigation: Bird's Eye Map.	4	8
TOTAL			**50**	**100**

Text Books:

1. Sosulski, K. (2018). Data Visualization Made Simple: Insights into Becoming Visual. New York: Routledge.
2. Visualization Analysis & Design by Tamara Munzner (2014) (Links to an external site.) (ISBN 9781466508910)

Reference Books:

1. Few, S. (2012). Show me the numbers: Designing tables and graphs to enlighten. Burlingame, CA: Analytics Press.
2. Few, S. (2006). Information dashboard design: The effective visual communication of data. Sebastopol: O'Reilly.
3. Ware, C & Kaufman, M. (2008). Visual thinking for design. Burlington: Morgan Kaufmann Publishers.
4. Wong, D. (2011). The Wall Street Journal guide to information graphics: The dos and don'ts of presenting data, facts and figures. New York: W.W. Norton & Company. Yau, N. (2011). Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics. Indianapolis: O'Reilly.