SHRI SHANKARACHARYA TECHNICAL CAMPUS
Shri Shankaracharya Group of Institutions
Faculty of Engineering & Technology
(Managed by Shri Gangajali Education Society, Bhilai)
JUNWANI, BHILAI-490 020 (CHHATTISGARH), INDIA
Phone: 0788-2291605, 2291607, Fax: 0788-2291606, E-mail: ssgi@ssgi.edu.in

DEPARTMENT OF INFORMATION TECHNOLOGY

M. Tech Information Technology

(Artificial Intelligence & Machine Learning)

Scheme & Syllabus
3rd & 4th Semester

Submitted Under

BOS Information Technology

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

M.Tech. (Information Technology)

(Specialization in AI & Machine Learning).

Semester – III

S. No	Board of Study	Subject Code	Subject	Periods			Scheme of Examination			Total Marks	Credit
							Theory/Practical				
				L	T	P	ESE	CT	TA		
1	Information Tech	IT 232301	Deep Learning & its Applications	3	1	-	100	20	20	140	**4**
2	Refer Table - III		Elective –III	3	1	-	100	20	20	140	**4**
3	Information Tech	IT 232391	Preliminary Work on Dissertation	-	-	28	100	-	100	200	**14**
4	Information Tech	IT 232392	Seminar	-	-	3	-	-	20	20	**2**
Total				**6**	**2**	**31**	**300**	**40**	**160**	**500**	**24**

L-Lecture, T- Tutorial, P - Practical, ESE- End Semester Examination, CT- Class Test, TA- Teacher's Assessment Note: Duration of all theory papers will be of Three Hours.

Elective-III			
Sr. No.	**Board of Study**	**Subject Code**	**Subject Name**
1	Information Technology	IT 232321	Advances in Cryptography & N/w Security
2	Information Technology	IT 232322	Pattern Recognition
3	Information Technology	IT 232323	Natural Language Processing Techniques
4.	Information Technology	IT 232324	Data visualization

L- Lecture, T- Tutorial, P- Practical , ESE- End Semester Exam, CT- Class Test TA- Teacher's Assessment

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

M.Tech. (Information Technology)

(Specialization in AI & Machine Learning).

Semester – IV

S. No.	Board of Study	Subject Code	Subject	Periods			Scheme of Examination			Total Marks	Credit
							Theory/Practical				
				L	T	P	ESE	CT	TA		
1	Information Technology	IT 232491	Project+ Seminar	6	-	34	300	-	200	500	**23**
Total				**6**	**-**	**34**	**300**	**-**	**200**	**500**	**23**

L- Lecture T- Tutorial P- Practical ,
ESE- End Semester Exam CT- Class Test TA- Teacher's Assessment

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Deep Learning and its Application	L = 3	T = 1	P = 0	Credits = 4
IT 232301	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

Course Objective	Course Outcomes
1. Learn deep L earning methods for working with sequential data. 2. Learn deep recurrent and memory networks, 3. Learn deep Gradient Descents, 4. Apply such deep learning mechanisms with Neural Networks to various learning problems 5. Know the open issues in deep learning, and have a grasp of the current research directions.	The students would be able to: CO1:- Students will to gain various techniques to work with sequential data. CO2: - Students will to understand various memory networks. CO3:- Students will able to understand various optimization techniques CO4:- Students will able to understand various deep learning methods like Convolution Neural Networks CO5:- have a grasp of the open issues and trends of deep learning

UNIT I: Introduction to Tensor Flow : CO1

Computational Graph, Key highlights, Creating a Graph, Regression example, Gradient Descent, Tensor Board, Modularity, Sharing Variables, Keras **Perceptrons:** What is a Perceptron, XOR Gate. [5Hrs]

UNIT II: Activation Functions : CO2

Sigmoid, ReLU, Hyperbolic Fns, Softmax

Artificial Neural Networks: Introduction, Perceptron Training Rule, Gradient Descent Rule. [4Hrs]

.

UNIT III: Gradient Descent and Back propagation: CO3

Gradient Descent, Stochastic Gradient Descent, Back propagation, Some problems in ANN

Optimization and Regularization : Overfitting and Capacity, Cross Validation, Feature Selection, Regularization, Hyperparameters [4Hrs]

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Deep Learning and its Application	L = 3	T = 1	P = 0	Credits = 4
IT 232301	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

UNIT IV: Introduction to Convolution Neural Networks: CO4

Introduction to CNNs, Kernel filter, Principles behind CNNs, Multiple Filters, CNN applications **Introduction to Recurrent Neural Networks:** Introduction to RNNs, Unfolded RNNs, Seq2Seq RNNs, LSTM, RNN applications. [4Hrs]

.

UNIT V: Deep Learning Applications: CO5

Image Processing, Natural Language Processing, Speech Recognition, Video Analytics. [4Hrs]

.

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	Deep Learning	Goodfellow, I., Bengio,Y., and Courville, A	2016 Edition	MIT Press, 2016
2	Pattern Recognition and Machine Learning	Bishop, C. ,M	2006 Edition	Springer, 2006

Reference Books:

S. No.	Title	Authors	Edition	Publisher
1	Artificial Neural Networks	Yegnanarayana, B	2009 Edition	PHI Learning Pvt. Ltd, 2009
2	Matrix Computations	Golub, G., H., and Van Loan,C.,F	2013 Edition	JHU Press,2013
3.	Neural Networks: A Classroom Approach	Satish Kumar	2004 Edition	Tata McGraw-Hill Education, 2004

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Advanced in Cryptography & Network Security	L = 3	T = 1	P = 0	Credits = 4
IT 232321	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

Course Objective	Course Outcomes
Students undergoing this course are expected to 1. Learn fundamentals of cryptography and its application to network security. 2 Understand network security threats, security services, and countermeasures. 3 Acquire background on well known network security protocols such as IPSec, SSL, and WEP. 4 Understand vulnerability analysis of network security. 5 Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.	After successful completion of this course, the students will be able to explain **CO1:-** Conventional encryption algorithms for confidentiality and their design principles **CO2:-** Public key encryption algorithms and their design principles **CO3:-** Use of message authentication codes, hash functions, digital signature and public key certificates **CO4:-** Network security tools and applications **CO5:-** System-level security issues like threat of and countermeasures for intruders and viruses, and the use of firewalls and trusted systems.

UNIT I: Overview: CO1

Security trends, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security. **Symmetric (Private Key) Ciphers: Classical Encryption Techniques:** Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. **Block Ciphers and the Data Encryption Standard:** Block Cipher Principles,The Data Encryption Standard (DES), The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles. [5Hrs]

UNIT II : Symmetric Ciphers (continued): **Basic Concepts in Number Theory and Finite Fields:** CO2

Groups, Rings, and Fields, Modular Arithmetic**,** the Euclidian algorithm, Finite Fields of the Form GF(p),Polynomial Arithmetic, Finite Fields of the Form GF(2*n*). **Advanced Encryption Standard:** The Origins AES, Evaluation criteria for AES, the AES Cipher. **Stream cipher**: Stream ciphers and RC4. **Confidentiality using symmetric encryption**: Placement of encryption function, traffic confidentiality, key distribution. [5Hrs]

UNIT III : Asymmetric (Public Key) Ciphers: Introduction to Number Theory: C03

Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms. **Public-Key Cryptography and RSA:** Principles of Public-Key Cryptosystems. **Key Management-Other Public-Key Cryptosystems:** Key management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.. [5Hrs]

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Advanced in Cryptography & Network Security	L = 3	T = 1	P = 0	Credits = 4
IT 232321	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

UNIT IV : **Asymmetric Ciphers (continued): Message Authentication and Hash functions**: CO4
Message authentication requirements, authentication functions, Message authentication codes, Hash functions, Security of Hash functions and MAC, SHA, HMAC, CMAC. **Digital Signatures and Authentication protocols**: Digital signature, Authentication protocols, Digital signature standards [4Hrs]

UNIT V: **Network Security applications: Authentication applications:** C05
Kerberos, X.509 Authentication services, Public key infrastructure. **Electronic mail security**: PGP, S/MIME. Overview of IP Security. **Web Security**: Web security considerations, SSL and TLS, Secure electronic transaction. **System Security:** Intruders, Intrusion detection, password management, viruses and related threats, virus counter measures, Firewall design principles, and trusted systems.
. [5Hrs]

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	Cryptography and Network Security, Principles and Practices	William Stallings	4th Edition	Pearson Education, Prentice Hall
2	Cryptography and Network Security	Atul Kahate	3rd edition	McGraw Hill Education (India) Private Limited

Reference Books:

S. No.	Title	Authors	Edition	Publisher
1	Applied Cryptography: Protocols & Algorithms	Schneier & Bruce		MGH International
2	Cryptography and Security	Dr T R Padmanabhan N Harini		Wiley India Pvt Ltd, 2011

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Pattern Recognition	L = 3	T = 1	P = 0	Credits = 4
IT 232322	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

Course Objective	Course Outcomes
1. To Elaborate on the fundamentals of pattern recognition . 2. To Provide an overview of Bayesian decision theory. 3. To Understand Unsupervised learning and clustering. 4. To Provide hands on Maximum-Likelihood estimation and Bayesian estimation. 5. To Understand Sequential Models.	The students will be able to: **CO1**:- Understand the concept and application of statistical decision making in pattern recognition. **CO2**:- Understand the applications of parametric and Non-parametric decision making techniques in Machine Learning. **CO3:**- Differentiate the concept of supervised and unsupervised learning in pattern classification. **CO4:**- Implement various machine learning algorithms. **CO5:**- Implementation of Sequencial Models.

UNIT I : Pattern Recognition Fundamentals: **CO1**

Basic concepts of pattern recognition, fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model. [5Hrs]

UNIT II : Bayesian Decision Theory and Maximum-Likelihood: **CO2**

Minimum-error-rate classification, Classifiers, Discriminant functions, Decision surfaces, Normal Density and Discriminant functions, Discrete features, Missing and noisy features, Bayesian networks (Graphical models) and Inferencing. Maximum-Likelihood estimation: Gaussian case, Maximum a Posteriori estimation, Bayesian estimation: Gaussian case, Problems of dimensionality, Dimensionality reduction: Fisher Discriminant analysis, PCA Expectation Maximization method: Missing features. [4Hrs]

UNIT III : **Clustering and Feature Selection:** **CO3**

Minimum within Cluster Distance Critewrion, k-menas algorithm single linkage, complete linkage and average linkage algorithms, Isodata algorithm etc. Feature Selection: Algorithms for feature selection such as Branch and Bound, Sequential forward and backward selections, GSFS and GSBS, (L, R) Algorithm. Criterion function: Probabilistic Separability criterion, error probability based criterion, entropy based criterion, minimum within class distance based criterion, probabilistic independence. Principal Component Analysis.

[4Hrs]

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Pattern Recognition	L = 3	T = 1	P = 0	Credits = 4
IT 232322	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

UNIT IV : Sequential Models: **CO4**

State Space, Hidden Markov models, Dynamic Bayesian, Non-parametric techniques for density estimation: Parzen-window method, K-Nearest Neighbour method, Linear discriminant functions: Gradient descent procedures, Perceptron Criterion Function, Minimum-squared-error procedures, Ho-Kashyap Procedures, Support vector machines. [4Hrs]

UNIT V : Unsupervised Learning and Clustering: **CO5**

Unsupervised maximum-likelihood estimates, Unsupervised Bayesian learning, Criterion functions for clustering, Algorithms for clustering: K-means, Hierarchical and other methods, Cluster validation, Low-dimensional representation and multidimensional scaling (MDS). [4Hrs]

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	Pattern Classification	R. O. Duda, P. E. Hart and D. Stork	2nd. Edition	Wiley 2002
2	Pattern Recognition and image analysis	Earl Gose, Richard Johnsobaugh, Steve Jost	EEE adition	PHR publication

ReferenceBooks:

S. No.	Title	Authors	Edition	Publisher
1.	Pattern Recognition and Machine Learning	C. Bishop	2006 Edition	Springer 2006
2.	Statistics and the Evaluation of Evidence for Forensic Scientists	C. Aitken and F. Taroni	2004 Edition	Wiley, 2004

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Natural Language Processing	L = 3	T = 1	P = 0	Credits = 4
IT 232323	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

Course Objective	Course Outcomes
1. To understand the basic concept of Natural language processing. 2. To gain the basic knowledge of Regular expressions. 3. To understand different machine learning approaches. 4. To understand different applications of NLP and use for Machine Translation. 5. To understand Machine Translation.	**Student will be able to** **CO1**:-Implement using basic concept of Natural Language processing. **CO2**:-Use of Regular expressions. **CO3**:-Implement different machine Learning approaches. **CO4**:-Use applications of NLP. **CO5:-** Implement the Machine translation **.**

UNIT I: Introduction : **CO1**

Human languages, models, ambiguity, processing paradigms; Phases in natural language processing, applications. Text representation in computers, encoding schemes. Linguistics resources- Introduction to corpus, elements in balanced corpus, TreeBank, PropBank, WordNet, VerbNet etc.Resource management with XML, Management of linguistic data with the help of GATE, NLTK [5Hrs]

UNIT II: Regular Expression and Finite State Automata : **CO2**

Regular expressions, Finite State Automata, word recognition, lexicon. Morphology, acquisition models, Finite State Transducer.N-grams, smoothing, entropy, HMM, ME, SVM, CRF.Part of Speech tagging-Stochastic POS tagging, HMM, Transformation based tagging (TBL), Handling of unknown words, named entities, multi word expressions. A survey on natural language grammars, lexeme, phonemes, phrases and idioms, word order, agreement, tense, aspect and mood and agreement, Context Free Grammar, spoken language syntax. [4Hrs]

UNIT III: Parsing & Semantic Analysis: **CO3**

Parsing- Unification, probabilistic parsing, Tree Bank. Semantics- Meaning representation, semantic analysis, lexical semantics, Word Net Word Sense Disambiguation- Selectional restriction, machine learning approaches, Dictionary based approaches. [5Hrs]

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Natural Language Processing	L = 3	T = 1	P = 0	Credits = 4
IT 232323	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

UNIT IV: Discourse & Applications: **CO4**

Discourse- Reference resolution, constraints on co-reference, algorithm for pronoun resolution, text coherence, discourse structure. Applications of NLP- Spell-checking, Summarization Information Retrieval- Vector space model, term weighting, homonymy, polysemy, synonymy, improving user queries. [4Hrs]

UNIT V: Machine Translation: **CO5**

Machine Translation– Overview [4Hrs]

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	Speech and Language Processing	Daniel Jurafsky and James H Martin	3rd Edition	Pearson Education, 2009

Reference Books:

S. No.	Title	Authors	Edition	Publisher
1	Natural language Understanding	James A	2nd Edition	Pearson Education, 1994
2	Natural language processing: a Paninian perspective	Bharati A., Sangal R., Chaitanya V	2nd Edition	PHI, 2000
3	Natural language processing and Information retrieval,	Siddiqui T., Tiwary U. S	3rd Edition	OUP, 2008

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Data Visualization	L = 3	T = 1	P = 0	Credits = 4
IT 232324	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

Course Objective	Course Outcomes
1. To understand technological advancements of data visualization 2. To understand various data visualization techniques 3. To understand basics of D3.js 4. Students will able demonstrate the ability to apply knowledge gained from one area problems and data in another. 5. Students will able to demonstrate the ability to communicate findings and their implications	**CO1**:-Applying visual design principles to simple and complex models. **CO2**:-Merge approaches to visualization with design principles and review patterns. **CO3**:-Able to use analog and digitals tools. **CO4**:-Able to translate meaning of data into comprehensible data or visual contents. **CO5**:-Understand the exploration of data based hypotheses.

UNIT I: Introduction to Data Visualization: CO1

Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Applications of Data Visualization, Keys factors of Data Visualization (Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar)

Exploring the Visual Data Spectrum: charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, Area Charts), Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Info graphics). Making use of HTML5 CANVAS, Integrating SVG. [5Hrs]

.

UNIT II: Basics of Data Visualization - Tables: CO2

Reading Data from Standard text files (.txt, .csv, XML), Displaying JSON content Outputting Basic Table Data(Building a table, Using Semantic Table, Configuring the columns), Assuring Maximum readability(Styling your table, Increasing readability, Adding dynamic Highlighting), Including computations, Using data tables library, relating data table to a chart. [4Hrs]

UNIT III: Visualizing data Programmatically: CO3

Creating HTML5 CANVAS Charts (HTML5 Canvas basics, Linear interpolations, A simple column Chart, Adding animations), Starting with Google charts (Google Charts API Basics, A Basic bar chart, A basic Pie chart, Working with Chart Animations) [4Hrs]

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekanand Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

Second Year (3rd semester) M. Tech. [IT]

(Specialization in AI& Machine Learning).

Subject Code	Data Visualization	L = 3	T = 1	P = 0	Credits = 4
IT 232324	ESE	CT	TA	Total	ESE Duration
	100	20	20	140	3 Hours

UNIT IV: Introduction to D3.js: **CO4**

Getting setup with D3, Making selections, changing selection's attribute (attr()), D3 strives to be declarative, Changing methods, appending new elements, Putting all together, Selecting multiple elements with d3.selectall(), Building Bar charts with selections.

Data-joins; Conceptual overview of data joins, Enter and binding data, using a data join to make a Bar chart, Using anonymous functions to access bound data, finishing the rest of chart, storing data in objects

Sizing charts and Axes (Linear scales, Using smart margin conventions, adding axes, Ordinal scales and axes),Loading and filtering External data: Building a graphic that uses all of the population distribution data, Data formats you can use with D3, Creating a server to upload your data, D3's function for loading data, Dealing with Asynchronous requests, Loading and formatting Large Data Sets. [4Hrs]

UNIT V: Advanced Data Visualization: Making charts interactive and Animated : CO5

Data joins, updates and exits, interactive buttons, Updating charts, Adding transactions, using keys

Adding a Play Button: wrapping the update phase in a function, Adding a Play button to the page, Making the Play button go, Allow the user to interrupt the play, sequence. [4Hrs]

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	JavaScript and jQuery for Data Analysis and Visualization	Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery	2nd Edition	WROX
2	Visual story telling with D3	Ritchie S. King	1st Edition	Pearson

ReferenceBooks:

S. No.	Title	Authors	Edition	Publisher
1	Designing Data Visualizations: Representing Informational Relationships	A Julie Steele and Noah Iliinsky	------	O'Relly
2	Data Visualization: A Successful Design Process	Andy Kirk	------	PAKT
3.	Interactive Data Visualization for Web	Scott Murray	------	O'Relly

		October 2020	1.00	Applicable for AY 2020-21 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	