K.K. Wagh Institute of Engineering Education and Research, Nashik

Curriculum S.Y. MCA

w.e.f.: AY 2022-2023

K.K.Wagh Institute of Engineering Education and Research, Nashik (Autonomous)
Master of Computer Application
Details of Course Structure (2022): Semester - III S.Y.M.C.A.

Course Code	Course Type	Title of Course	Teaching Scheme Hrs./week			Evaluation Scheme and Marks						Credits			
			TH	TU	PR	In Sem	End Sem	CCE	TW/ TU	PR	Total	TH	TW/ TU	PR	Total
MCA223001	DCC	Data Science	3	-	2	20	60	20	25	-	125	3	-	1	4
MCA223002	DCC	Machine Learning	3	-	4	20	60	20	50	50	200	3	-	2	5
MCA223003	DCC	Cloud Computing	3	-	-	20	60	20	-	-	100	3	-	-	3
MCA223004	DEC/ OEC	Elective II A: Information and Network Security B: Current Trends in Computing C: Industry Elective	3	-	-	20	60	20	-	-	100	3	-	-	3
MCA223005	DCC	Software Project Management and Testing	4	-	4	20	60	20	50	50	200	4	-	2	6
MCA223006	LHSM	Introduction to Constitution	2	-	-	-	30	20	-	-	50	2	-	-	2
MCA223007	PSI	Mini Project	-	-	2	-	-	-	25	-	25	-	-	1	1
		Total	**18**	**-**	**12**	**100**	**330**	**120**	**150**	**100**	**800**	**18**	**-**	**6**	**24**

K.K.Wagh Institute of Engineering Education and Research, Nashik (Autonomous)
Master of Computer Application
Details of Course Structure (2022): Semester - IV S.Y.M.C.A.

Course Code	Course Type	Title of Course	Teaching Scheme Hrs./week			Evaluation Scheme and Marks						Credits			
			TH	TW/ TU	PR-OR	In Sem	End Sem	CCE	TW/ TU	PR-OR	Total	TH	TW/ TU	PR-OR	Total
MCA224001	PSI	Major Project	-	-	18	-	-	-	100	200	300	-	-	18	18
MCA224002	PSI	Technical Seminar	-	-	4	-	-	-	50	-	50	-	-	2	2
MCA224003	PSI	Research Paper / MOOC	-	-	4	-	-	-	50	-	50	-	-	2	2
		Total	**-**	**-**	**26**	**-**	**-**	**-**	**200**	**200**	**400**	**-**	**-**	**22**	**22**

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: III
MCA223001: Data Science

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week **Practical : 02hrs/week**	**03** **01**	**InSem Exam: 20Marks** **Continuous Assessment: 20Marks** **EndSem Exam:60Marks** **TermWork: 25Marks**

Prerequisite Courses, if any: Discrete Mathematics

Course Objectives:

- Define the principal concepts about probability.
- Understand applied statistics for Data Science
- Understand statistical data using measures of central tendency and dispersion
- Define the distributions and solve the problems about these distributions.
- Understand the concept of Correlation and Regression

Course Outcomes: On completion of the course Students will be able to

	Course Outcomes	**Bloom's Level**
CO1	Explain the concept of a random variable and the distributions functions	2-Understand
CO2	Apply the basic probability rules and Bayes' Theorem to compute probabilities	3-Apply
CO3	Apply concepts of various probability distributions to find probabilities	3-Apply
CO4	Apply the concept of Correlation and Regression	3-Apply
CO5	Analyze statistical data using measures of central tendency and dispersion	4-Analyze

COURSE CONTENTS

Unit I	**Data science and Probability**	**07hrs**	**COs Mapped – CO2**

Data Science: Concept of Data Science, Need of Data Science, Big data and Data Science

Interpretation of probability, sample space and events, Mutually Exclusive events, Independent events, Binomial Theorem, Multinomial Theorem, Axioms of probability, conditional probability, Multiplication Rule, Bayes' Theorem

Unit II	**Descriptive Measures**	**07hrs**	**COs Mapped – CO5**

Measures of central tendency(mean, median, mode), Measures of dispersion(Variance, Standard Deviation, Range), coefficients of variation, Moments, Skewness and Kurtosis

Unit III	**Distribution Functions**	**07hrs**	**COs Mapped – CO1**

Random Variables, Distribution Functions (discrete and continuous), properties of distribution functions, probability mass function(p.m.f), probability density function(p.d.f), cumulative distribution functions (discrete and continuous)

Unit IV	**Probability Distribution**	**08hrs**	**COs Mapped –**

			CO3
Mathematical Expectations, Moment Generating functions Bernoulli Trials, Discrete Distributions: Geometric, Binomial, Poisson and Uniform distributions Continuous Distribution: Normal, Standard Normal and Uniform distributions			
Unit V	**Correlation and Regression**	**7hrs**	**COs Mapped – CO4**
Covariance , concept of correlation, Karl's Pearson's Coefficient of Correlation, Rank Correlation coefficient, Spearman's rank Correlation coefficient Regression: Lines of regression, regression coefficient			

Text Books

1. Trivedi K., "Probability and Statistics with reliability, Queuing, and Computer Science Applications", PHI, ISBN: 81-203-0508-6
2. Spiegel, Schiller, "Probability and Statistics" 2nd Edition, TMH, ISBN: 0-07-058610-1

Reference Books

1. Papoulis, Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, TMH, ISBN: 0-07-048658-1
2. S. Vaidyanathan, " Probability, Statistics and Queuing Theory" (PHI Learning, India) October 2009, Edition: 1st Publisher: PHI Learning Private Limited, India ISBN: 978-81-203-3844-9

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	1	1	1	1	2	-	2	-	-	1
CO2	3	2	1	1	1	-	2	-	2	-	-	1
CO3	3	2	1	1	1	1	2	-	2	-	-	1
CO4	3	2	1	1	1	1	2	-	2	-	-	1
CO5	3	2	1	1	1	1	2	-	2	-	-	1

Guidelines for Continuous Comprehensive Evaluation for Theory Course		
Sr. No.	**Components for Continuous Assessment**	**Marks Allotted**
1	Quiz - 1 on unit 1 ,2 & 3 Quiz - 1 on unit 4 & 5	10
2	Assignments – 1 on unit 1,2,3 Assignments – 2 on unit 4,5	10

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Write a Python script for Bayes' theorem	**CO2**
2	Write a Python script to find Measures of central tendency	**CO5**
3	Write a Python script to find moments, skewness and kurtosis.	**CO5**
4	Write a Python script to find Binomial distribution	**CO3**
5	Write a Python script for Correlation and Covariance a. Find the correlation matrix. b. Plot the correlation plot on dataset and visualize giving an overview of relationships among any dataset.	**CO4**

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Based on the concepts learned, instructor will ensure mini-project development by the students
3. Instructor should identify and set one assignment beyond the scope of syllabus.
3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Course in-charge is highly encouraged to maintain softcopy of all the students assignments

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**
Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks		

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: III
MCA223002: Machine Learning

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Theory :03 hrs/week **Practical : 04hrs/week**	**03** **02**	**InSem Exam: 20Marks** **Continuous Comprehensive Evaluation: 20Marks** **EndSem Exam:60Marks** **Practical Exam:50Marks** **Term Work: 50Marks**

Prerequisite Courses, if any:Discrete Mathematics

Course Objectives:
1. To explore various data pre-processing methods
2. To study regression and classification method
3. To learn working of clustering algorithms
4. To understand data mining concepts

Course Outcomes: On completion of the course students will be able to

	Course Outcomes	Bloom's Level
CO1	Describe basic concepts of Machine Learning	2-Understand
CO2	Illustrate pre-processing techniques	3-Apply
CO3	Apply different regression and classification techniques	3-Apply
CO4	Implement clustering methods	3-Apply
CO5	Demonstrate data mining concepts	3-Apply

COURSE CONTENTS

Unit I	Machine Learning	07hrs	COs Mapped - CO1

Overview: Concept of Machine Learning, traditional programming vs Machine learning, validation techniques, Training versus Testing, Positive and Negative Class

Types of Learning: Supervised, Unsupervised, Semi-Supervised Learning and Reinforcement learning

Models of Machine learning: Geometric model, Probabilistic Models, Logical Models, Grouping and grading models, Parametric and non-parametric models.

Unit II	Feature Engineering	07hrs	COs Mapped – CO2

Feature Engineering: Concept of Feature, Preprocessing of data: Normalization and Scaling, Standardization, Managing missing values, Dimensionality Reduction, Feature Extraction: Principal Component Analysis (PCA), Local Binary Pattern

Unit III	Supervised Learning	08hrs	COs Mapped – CO3

Regression: Overview of Regression, Linear Regression Models and Least Squares, Overfitting and

Underfitting, Bias and Variance Dilemma,

Binary and Multiclass Classification: Assessing Classification Performance, Handling more than two classes, Multiclass Classification-One vs One, One vs Rest,

Tree Based Models: Decision Trees, Minority Class, Impurity Measures – Gini Index and Entropy, Best Split ,K-nearest neighbour, Support vector machine, Naïve Bayes Classifier

Unit IV	**Unsupervised Learning**	**07hrs**	**COs Mapped – CO4**

Distance Based Models: Euclidean, Manhattan and Minkowski Distance Metric, K-means clustering Algorithm, k-medoid algorithm, Hierarchical Clustering: divisive and agglomerative

Unit V	**Data mining**	**7hrs**	**COs Mapped – CO5**

Need of data mining , knowledge discovery from data, or KDD, issues in data mining

Association Rule Mining:

Frequent Itemsets, Closed Itemsets, and Association Rules, Apriori Algorithm, Generating Association Rules from Frequent Itemsets, frequent pattern growth algorithm

TextBooks

3. Ethem Alpaydin," Introduction to Machine Learning", PHI 2nd Edition-2013.
4. C. M. Bishop," Pattern Recognition and Machine Learning", Springer 1st Edition-2013

ReferenceBooks

3. Ian H Witten, Eibe Frank, Mark A Hall, "Data Mining, Practical Machine Learning Tools and Techniques", Elsevier, 3rd Edition.
4. Jiawei Han, Micheline Kamber, and Jian Pie, "Data Mining: Concepts and Techniques", Elsevier Publishers Third Edition, ISBN: 9780123814791, 9780123814807
5. Hastie, Tibshirani, Friedman "Introduction to Statistical Machine Learning with Applications in R", Springer, 2nd Edition 2012.
6. Kevin P Murphy, "Machine Learning – A Probabilistic Perspective", MIT Press, August 2012.
7. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", Cambridge University Press, Edition 2012.

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	1	2	-	-	-	1	-	-	-	-	-
CO2	2	2	1	1	1	-	1	1	1	1	2	-
CO3	2	2	2	-	1	-	1	1	-	-	-	-
CO4	2	2	2	-	1	-	1	-	-	1	-	-
CO5	1	1	2	1	1	-	1	-	-	-	-	-

Guidelines for Continuous Comprehensive Evaluation for Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Micro Project	10
2	Assignments – 1 on unit 1,2,3 Assignments – 2 on unit 4,5	10

<table>
<tr><th colspan="3">List of Laboratory Experiments / Assignments</th></tr>
<tr><th>Sr. No.</th><th>Laboratory Experiments / Assignments</th><th>CO Mapped</th></tr>
<tr><td>1</td><td>Perform the following operations using Python on the given data sets
<table>
<tr><td>Region</td><td>Age</td><td>Income</td><td>Online Shopper</td></tr>
<tr><td>India</td><td>49</td><td>86400</td><td>No</td></tr>
<tr><td>Brazil</td><td>32</td><td>57600</td><td>Yes</td></tr>
<tr><td>USA</td><td>35</td><td>64800</td><td>No</td></tr>
<tr><td>Brazil</td><td>43</td><td>73200</td><td>No</td></tr>
<tr><td>USA</td><td>45</td><td></td><td>Yes</td></tr>
<tr><td>India</td><td>40</td><td>69600</td><td>Yes</td></tr>
<tr><td>Brazil</td><td></td><td>62400</td><td>No</td></tr>
<tr><td>India</td><td>53</td><td>94800</td><td>Yes</td></tr>
<tr><td>USA</td><td>55</td><td>99600</td><td>No</td></tr>
<tr><td>India</td><td>42</td><td>80400</td><td>Yes</td></tr>
</table>
a)Importing the libraries
b) Importing the Dataset
c) Handling of Missing Data
d) Handling of Categorical Data
e) Splitting the dataset into training and testing datasets
f) Feature Scaling</td><td>CO2</td></tr>
<tr><td>2</td><td>Implement Principal Component Analysis (PCA) using python.</td><td>CO2</td></tr>
<tr><td>3</td><td>Implement linear regression on Data set</td><td>CO3</td></tr>
<tr><td>4</td><td>Design and implement SVM for classification with the proper data set. Test for Accuracy and Precision.</td><td>CO3</td></tr>
<tr><td>5</td><td>Implement Naïve Bayes Classifier on Data set.</td><td>CO3</td></tr>
<tr><td>6</td><td>K-Nearest Neighbor Classifier on Data set. Test for Accuracy and Precision.</td><td>CO3</td></tr>
<tr><td>7</td><td>Implement K-Means Clustering on the proper data set.</td><td>CO4</td></tr>
<tr><td>8</td><td>Implement K-Medoid Clustering on the proper data set.</td><td>CO4</td></tr>
<tr><td>9</td><td>Implement Hierarchical clustering on the proper data set.</td><td>CO4</td></tr>
<tr><td>10</td><td>Implement Apriori algorithm to find frequently occurring items from given data and generate strong association rules using support and confidence thresholds for the given dataset.</td><td>CO5</td></tr>
</table>

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Instructor should identify and set one assignment beyond the scope of syllabus.
3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-Concept in brief, algorithm, flowchart, conclusion.).

3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Course in-charge is highly encouraged to maintain softcopy of all the students assignments

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**
Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks		

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: III
MCA223003: Cloud Computing

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 03 hrs/week	**03**	**InSem Exam: 20Marks** **Continuous Comprehensive Evaluation:20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses, if any: Data Communication and Network

Course Objectives:

1. To illustrate fundamentals of cloud computing
2. To have comprehensive knowledge of cloud computing
3. To use various cloud computing platforms, tools and cloud based applications

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Understand the different cloud computing environment	2 - Understand
CO2	Understand virtualization technology and Cloud Architecture	2 - Understand
CO3	Use of various cloud platforms	3 - Apply
CO4	Demonstrate and develop applications on Cloud	3 - Apply
CO5	Illustrate advance techniques in Cloud Computing	3 - Apply

COURSE CONTENTS

Unit I	**Cloud Computing**	**07hrs**	**COs Mapped - CO1**

Defining a cloud, vision of cloud computing, cloud computing reference model, characteristics and benefits, challenges of cloud, History of cloud computing, Computing platforms and technologies: Amazon Web Services (AWS), Microsoft Azure, Manjrasoft Aneka

Unit II	**Virtualization and Cloud Computing Architecture**	**07hrs**	**COs Mapped – CO2**

Virtualization, Taxonomy of virtualization techniques, Virtualization and Cloud computing, Types of Virtualization, Cloud Architecture: Cloud computing logical architecture, Cloud System architecture, Type of clouds, Reference Model –Iaas, PaaS, SaaS, Amazon EC2

Unit III	**Cloud Platforms**	**07hrs**	**COs Mapped – CO3**

Amazon Web Services (AWS): Amazon Web Services and Components, Amazon Simple DB, Amazon Storage System, Amazon Database services (Dynamo DB)
Microsoft Cloud Services: Azure core concepts, SQL Azure, Windows Azure Platform Appliance.
Google App Engine: Architecture and core concepts, Application life cycle.Salesforce.com

Unit IV	**Cloud Tools and Applications**	**08hrs**	**COs Mapped – CO4**

Containers technology: Docker, Kubernetes. Serverless Computing, Orchestration, Build and release, Continuous Integration & Delivery – Jenkins, Automate Configuration Management – Ansible,
Case study: Spotify using Docker.
Cloud Computing Applications: Healthcare: ECG Analysis in the cloud, Geosciences: Satellite Image Processing, Business and Consumer: CRM and ERP, Social Networking.

Unit V	**Advanced techniques of Cloud Computing**	**07hrs**	**COs Mapped – CO5**

System Development Life Cycle using DevOps, Principle of container based application design, Google

DevOps Solutions. Future Trends in Cloud Computing, Cloud Computing and Business Intelligence, Case studies on open source and commercial clouds.

Text Books

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education, ISBN-13:978-1-25-902995-0

2. Rajkumar Buyya, Christian Vecchiola, "Mastering Cloud Computing Foundations and Applications Programming", Morgan Kaufmann, 2nd Edition, 2013.

3. A. Srinivasan, J. Suresh, "Cloud Computing: A Practical Approach for Learning and Implementation", Pearson, ISBN: 978-81-317-7651-3

4. Viktor Farcic, "The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline with Containerized Microservices", CreateSpace Independent Publishing Platform; 1st edition

Reference Books

1. Rajkumar Buyya,"Cloud Computing Principles and Paradigms", Wiley

2. Ricardo Puttini, Thomas Erl, Zaigham Mahmood, ,"Cloud Computing: Concepts, Technology and Architecture", Prentice Hall, 1st Edition, 2013

3. Zaigham Mahmood, "Cloud Computing: Challenges, Limitations and R&D Solutions", Springer International Publishing, 1st edition, 2014

4. Dr. Kris Jamsa, "Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile,Security and more", Wiley Publications, ISBN:978-0-470-97389-9

5. Anthony Velte, Robert Elsenpeter, Toby J. Velte, "Cloud Computing: A Practical Approach", 2010, The McGraw Hill.

6. Shahid Latif, Subra Kumarswamy, Tim Mather, "Cloud Security and Privacy", Oreilly, ISBN-13: 978-81-8404-815-5

7. Jennifer Davis and Katherine Daniels, "Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale", O'Reilly Media, Inc., ISBN: 978-1-491-92630-7

8. Sanjeev Sharma and Bernie Coyne, "DevOps for Dummies", John Wiley & Sons, Inc., 2nd IBM Limited Edition, ISBN: 978-1-119-04705-6

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	1	1	1	-	-	-	1	-	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-
CO3	3	2	2	1	3	-	1	2	-	-	1	-
CO4	3	2	2	1	3	2	1	2	1	1	2	2
CO5	3	2	2	2	2	2	1	2	1	1	1	2

Guidelines for Continuous Comprehensive Evaluation for Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Seminar	10
2	Assignments – 1 on unit 1,2,3 Assignments – 2 on unit 4,5	10

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: III
MCA223004A: Elective II: Information and Network Security

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 03 hrs/week		**InSem Exam: 20Marks** **Continuous Comprehensive Evaluation: 20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses, if any: Data Communication and Network, Python, OOP

Course Objectives:
1. To understand the concepts of the Internet and Network Security
2. To acquaint with security issues in internet protocols.
3. To analyze the system for vulnerabilities.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Explain the concepts of Information security and their use	2 - Understand
CO2	Use the various symmetric key algorithms	3 - Apply
CO3	Apply the concepts of Network security	3 - Apply
CO4	Outline the concepts of Email and Web Security	4 - Analyze
CO5	Select the techniques to develop computer forensics awareness	5 - Evaluate

COURSE CONTENTS

Unit I	**Information Security**	**07 hrs**	**COs Mapped - CO1**

Information Security Concepts, Security Threats and Vulnerabilities, Security Architectures and Operational Models, Types of Security attacks, Goals of Security, Malicious code, Intrusion detection system (IDS): Need, Types, Limitations and Challenges, security and privacy

Unit II	**Cryptography**	**08 hrs**	**COs Mapped – CO2**

Symmetric Cipher Model, Cipher Block Chaining Mode, Cryptography, Cryptanalysis and Attacks; Substitution and Transposition techniques, Stream ciphers and block ciphers, Block Cipher structure, Data Encryption standard (DES) with example, strength of DES, Design principles of block cipher, AES: Structure, Transformation functions, key expansion, example and implementation, Diffie-Hellman Key Exchange algorithm

Unit III	**Network Security**	**07 hrs**	**COs Mapped – CO3**

Wireless Network Security: Wireless Network Threats, Wireless Security Measures, Mobile Device Security: Elements, Security Threats, Network Access Control: Elements of a Network Access Control System, Network Access Enforcement Methods, Extensible Authentication Protocols: EAP-TLS, EAP-TTLS, EAP-GPSK, EAP-IKEv2.

Unit IV	**Email and Web Security**	**07 hrs**	**COs Mapped – CO4**

Email Security: Pretty Good Privacy, S/MIME, Domain Keys Identified Mail, IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange, Cryptographic Suits, Web Security Considerations; Secure Socket Layers, Transport Layer Security, Secure Shell.

Unit V	Cyber Security	07 hrs	COs Mapped – CO5

Introduction, Phishing, Password Cracking, Key-loggers and Spywares, Types of Virus, Worms, DoS and DDoS, SQL injection, Buffer Overflow, Spyware, Adware and Ransomware. Antivirus and other security measures Intrusion Detection System : IDS fundamentals, Different types of IDS. Intrusion Prevention.

Text Books

1. Information Security: Principles and Practice, 2nd Edition by Mark Stamp Wiley
2. Cryptography and Network Security : William Stallings, Pearson Education,6th Edition
3. Nina Godbole, Sunit Belapure , Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiely India Pvt.Ltd, ISBN- 978-81-265-2179-1

Reference Books

1. Michael E. Whitman, Herbert J. Mattord , "Principles of Information Security", CENGAGE Learning, 4th Edition
2. Forouzan, Mukhopadhyay ,"Cryptography and Network Security" Mc Graw Hill, 2nd Edition
3. Bruce Schneier "Applied Cryptography Protocols, Algorithms, and Source Code in C"
4. Keith M. Martin , "Everyday Cryptography: Fundamental Principles and Applications" , Oxford Scholarship Online: December 2013

Strength of CO-PO/PSO Mapping

Course Outcomes	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	2	2	-	-	2	1	-	1	1	1
CO2	3	3	2	2	2	1	2	1	-	1	1	1
CO3	3	3	2	2	2	1	2	-	1	-	1	1
CO4	2	3	2	2	2	2	2	-	-	-	1	1
CO5	2	3	3	3	2	3	3	1	-	3	2	2

Guidelines for Continuous Comprehensive Evaluation for Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Quiz - 1 on unit 1, 2, 3 Quiz -2 on Unit 4, 5	10
2	Assignments – 1 on unit 1,2,3 Assignments – 2 on unit 4,5	10

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: III
MCA223004B: Elective II: Current Trends in Computing

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory :03 hrs/week	**03**	**InSem Exam: 20Marks** **Continuous Comprehensive Evaluation: 20Marks** **EndSem Exam:60Marks**

Prerequisite Courses, if any: Web Technology, Advance Web Technology

Course Objectives:
1. Understand concept of block chain systems.
2. Understand concept of Industry 4.0
3. To learn concepts of Go language.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Explain basic concepts of Web 3.0	2-Understand
CO2	Identify need of Blockchain and Cryptocurrency in today's world	2-Understand
CO3	To impart basic idea in Industry 4.0	2-Understand
CO4	Implement Android mobile application	3-Apply
CO5	Implement web application in Go language	3-Apply

COURSE CONTENTS

Unit I	**Web 3.0**	**06hrs**	**COs Mapped - CO1**

Basics of Web 1.0,Web 2.0, Features of Web 2.0, Web 1.0 v/s Web 2.0, Web 2.0 Features, Semantic Web Architecture
Web 3.0 : Major features of Web 3.0, Web 3.0 Development Stack, Web 1.0 V/S Web 2.0 VS Web 3.0, Potential and Pitfalls of Web 3.0, Limitations of Web 3.0

Unit II	**Blockchain**	**07hrs**	**COs Mapped – CO2**

Overview of Blockchain, The Structure of a Block and Blockchain,Working of Blockchain, classify Blockchain from A Regular Old Centralized Database, Decentralized Control, Advantages of Blockchain, Distributed, Disintermediation, High Quality Data, Transparency, Security, Traceability, Increased Speed and Efficiency, Reduced Costs, Concept of Cryptocurrencies

Unit III	**Industry 4.0**	**08hrs**	**COs Mapped – CO3**

Need – Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles -Technologies of Industry 4.0 – Big Data – Artificial Intelligence. Industrial Transfermation IoT Definition– Scope— Structure – Characteristics – Generation; I/O Devices : Sensors – Convertors - Actuators – Keyboard basics - LCD modules - Clock and Timer - Interrupts - Service routines - Interrupt-driven pulse width

Unit IV	**Android Studio**	**07hrs**	**COs Mapped – CO4**

Android Studio: Android Studio IDE, Compile and run small android application, Implement Intents, Adapters, Dialogs, Capturing Date and Time

Location Based Services: Application: Selecting Location Provider, Finding your location, Creating map based activities Data Storage

Retrieval and Sharing: File system in android, Internal and external storage, Saving and loading files, File Management tools

Unit V	**Web Development with Go**	**07hrs**	**COs Mapped – CO5**

Getting started with Go: Identifiers, Keywords, Data Types, Variables, Write simple Go programs, Using Go for Web application: Scalable web application and Go, Modular web application and Go, Maintainable web application and Go, High performance web application with Go.

Text Books

1. Murugesan, San , "Blockchain and Web 3.0: Social, Economic, and Technological Challenges (Routledge Studies in Science, Technology and Society Book", 1st Edition, Kindle Edition by Massimo Ragnedda (Editor), Giuseppe Destefanis (Editor) · 2009
2. Yathish R and Tejaaswini N, "Blockchain for Beginners: The Art of Decentralisation & Cryptography"
3. Carmen Delessio , "Android Application Development", PEARSON INDIA
4. Sau Sheong Chang , "Go Web Programming Paperback – Illustrated", 28 July 2016

Reference Books

1. Lauren Dercy and Shande Conder , "Sams teach yourself Android application development", Sams publishing
2. Arshdeep Bahga, Vijay Madisetti, "Blockchain Applications: A Hands On Approach", VPT, 2017.

Reference Links

MOOC Courses:

1. https://www.my-mooc.com/en/categorie/blockchain-and-cryptocurrency
2. https://www.coursera.org/specializations/blockchain

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	1	1	-	1	2	-	1	-	-	-	-	1
CO2	1	1	1	-	1	-	1	-	-	-	-	-
CO3	2	1	2	1	2	-	1	-	-	-	-	1
CO4	2	1	2	-	2	1	2	-	1	1	-	1
CO5	2	1	1	-	1	-	1	-	-	-	-	-

Guidelines for Continuous Comprehensive Evaluation for Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Quiz-I on Unit 1,2 and 3 Quiz-II on Unit 4 and 5	**10**
2	Assignment –I on Unit 1,2 and 3 Assignment –II on Unit 4 and 5	**10**

K. K. Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: III
MCA223004C: Elective-II: Industry Elective -Data Analytics

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 03 hrs/week	**03**	**InSem Exam: 20Marks** **Continuous Comprehensive Evaluation:20Marks** **EndSem Exam: 60Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

1. To study the representation, structural constraints, implementation and applications of basic data structures
2. To develop the ability to analyze algorithms
3. To learn linear and nonlinear data structures and their applications
4. To understand searching and sorting techniques and their applications
5. To study applications of Data Structure in solving real life problems

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	students will able to describe the data analytics concept	2 -Understand
CO2	students will able to use data manipulation concept in data analytics	3 - Apply
CO3	students will able to perform data processing using python library	3 - Apply
CO4	students will able to demonstrate the usage of data visualization in any real world scenarios	3 – Apply
CO5	students will able to differentiate data analytic tools	4 – Analyze

COURSE CONTENTS

Unit I	**Data Analytics**	**07hrs**	**COs Mapped - CO1**

Defining Data, Data Explosion: Data Volume, Data Variety, Data Velocity and Veracity. Data infrastructure and challenges Data Processing, Architecture and Life Cycle, Types of analysis, Analytical approaches, Data Analytics with Mathematical manipulations, Data Ingestion from different sources, data imputation, Data transformation, Data Standardization, handling categorical data

Unit II	**Data Manipulation**	**07hrs**	**COs Mapped – CO2**

Concept of Data Manipulation, Data Manipulation Methods, labeling and ordering, Slicing and Filtering, Replacing and Thresholding, Removing and adding data, Apply, map and vectorised functions

Unit III	**Data Cleaning and Processing**	**07hrs**	**COs Mapped – CO3**

Data cleaning: Importance of data cleaning, data cleaning process, finding dirty data, duplicate data and rebuilding missing data

Essentials of Data Processing, Data Processing using python library: import data set, exploring the data, Hierarchical indexing

Unit IV	Data Visualization	07hrs	COs Mapped – CO4
Data visualization, Challenges to data visualization, Conventional data visualization tools, Techniques for visual data representations, Types of data visualization, Visualizing Data, Tools used in data visualization, proprietary data visualization Case Study: Analysis of a business problem of Zomato using visualization			
Unit V	**Data Analytic Tools**	**08hrs**	**COs Mapped – CO5**
Apache Spark: Spark Architecture, spark unified stack, Programming Spark using Pyspark, Identifying the computational tradeoffs in a Spark application, Performing data loading and cleaning using Spark and Parquet, Modeling data through statistical and machine learning methods Microsoft Power BI: Getting started with power BI, uploading data in Power BI, carry out natural language queries, quick insights			

Text Books

1. Data Analytics, Anil Maheshwari, McGraw Hill
2. Data Analytics with Spark Using Python, First edition, Jeffrey Aven, Addison-Wesley Professional

Reference Books

1. Data Analytics: 4 Books in 1- Bible of 4 Manuscripts- Beginner's Guide-Tips and Tricks, Effective Strategies and Best Practices to learn Data Analytics Efficiently by Daniel Jones, Kindle Edition

3. Data Analytics for Absolute Beginners: Make Decisions Using Every Variable: (Introduction to Data, Data Visualization, Business Intelligence & Machine learning using Python and Statistics for Beginners Book 2) by Oliver Theobald, Kindle Edition

3. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking 1st Edition, Kindle Edition

4. Data Analytics with Microsoft Excel and Power BI: This book will transform you into Data Analytics Expert .You will learn how to use MS Excel, VBA, Power Bi and Power BI Service Kindle Edition

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	1	2	1	-	-	-	-	1	-	-	-
CO2	3	1	2	1	-	-	-	-	1	-	-	-
CO3	3	1	2	1	-	-	-	-	1	-	-	1
CO4	3	2	2	2	-	-	1	-	1	-	-	1
CO5	3	2	1	2	-	-	1	-	-	-	-	1

Guidelines for Continuous Comprehensive Evaluation for Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Quiz - 1 on unit 1, 2 & 3 Quiz - 1 on unit 4 & 5	10
2	Assignments – 1 on unit 1,2,3 Assignments – 2 on unit 4,5	10

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: III
MCA223005: Software Project Management and Testing

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 04 hrs/week **Practical: 04 hrs/week**	**04** **02**	**InSem Exam: 20Marks** **Continuous Assessment:20Marks** **EndSem Exam: 60Marks** **Practical Exam: 50Marks** **Term Work: 50Marks**

Prerequisite Courses, if any: Software Engineering

Course Objectives:

4. To define and highlight importance of software project management
5. To describe the software project management activities
6. To train software project managers and other individuals involved in software project
7. To familiarize Project Management framework and Tools

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Describe the principles and techniques of project initiation, planning, and scope management	2-Understand
CO2	Develop the skills in creating detailed project plans that include all project activities, timelines, and resources needed in software project management	3- Apply
CO3	Illustrate principles and techniques of project monitoring and control	3-Apply
CO4	Use Software testing concept using testing methodologies	3-Apply
CO5	Implement software Automation Testing concept using Testing Tools	3-Apply

COURSE CONTENTS

Unit I	**Project initiation, Planning and Scope**	**07hrs**	**COs Mapped - CO1**

overview of Project Management, Project Manager Responsibilities, Project Manager Skills, Project Management Life Cycle, gathering project information, identifying the project needs, Traditional versus modern project management practices, Stepwise Project Planning, Creating the project scope, Work breakdown structure

Unit II	**Project Effort Estimation and Activity Planning**	**07hrs**	**COs Mapped – CO2**

Project Effort Estimation: Basis for software estimating, software effort estimation techniques, bottom up estimating , top down approach, parametric models, COCOMO: Parametric productivity model

Activity Planning: Objectives of Activity Planning, Project Schedule, Project and Activities, Sequencing and scheduling activities, formulating a Network planning models, Time Dimension: Forward and Backward, identifying the critical activities, activity on arrow network

Unit III	**Project Monitoring and Control**	**07hrs**	**COs Mapped – CO3**

Project control cycle, collecting the data, work product for review, visualizing the progress: Gantt chart, Slip chart, timeline, Cost Monitoring, Earned value analysis, Prioritizing monitoring, getting the project back to target, Change control

Risk Analysis : Reactive versus Proactive Risk Strategies, Software Risks, Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation, Risks Monitoring and Management, The RMMM plan for case study project.

Unit IV	**Software testing and Methodologies**	**08hrs**	**COs Mapped – CO4**

Definition and Objectives of testing, Software Testing Lifecycle model, Basic of identification of Test Scenario, Preparation of **Test Plan and Test Cases,** Defect repository **and Management**

White-Box testing methodologies: Static testing: by humans, using static analysis tools, Structural Testing: unit/code functional testing, Code coverage Testing, Code Complexity testing

Black-Box testing methodologies: Requirement based testing, Positive and negative testing, Boundary Value analysis, Equivalence Partitioning

Unit V	**Testing Tools**	**07 Hrs**	**COs Mapped – CO5**

Introduction to Automation Testing: Software Test Automation, Skills needed for Automation, Scope of Automation, Design and Architecture for Automation, Requirements for a Test Tool, Challenges in Automation Tracking the Bug, Debugging, manual testing and automated testing,

UI Automation Tools : Cypress, Testcafe, Protractor, Case studies of automation testing

Introduction of Selenium: Brief History of The Selenium Project, Selenium's Tool Suite: Selenium IDE, Selenium RC, Selenium WebDriver, Selenium Grid

Text Books

1. Bob Hughes, Mike Cotterell and Rajib Mall ,"Software Project Management", Sixth Edition, Tata McGraw-Hill
2. Pankaj Jalote, "Software Project Management in Practice", Pearson Education, 2002
3. Srinivasan Desikan, Gopalaswamy Ramesh, "Software Testing: Principles and Practices", Pearson.
4. Adithya P.Mathur, " Foundations of Software Testing – Fundamental Algorithms and Techniques", Pearson Education India, 2011

Reference Books

1. M. Cotterell, "Software Project Management", Tata McGraw-Hill Publication.
2. Joseph Phillips ,"IT Project Management: On Track from Start to Finish", Third Edition
3. Kieron Conway , "Software Project Management", Dreamtech Press
4. S. A. Kelkar, "Software Project Management", PHI Publication.
5. Kshirasagara Naik, Priyadarshi Tripathy, " Software Testing and Quality Assurance", Wiley India 2012
6. M.G.Limaye, "Software Testing-Principles, Techniques and Tools", McGraw Hill, 2009

Strength of CO-PO Mapping												
	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	1	-	-	-	1	2	1	1	1	1
CO2	2	1	1	-	-	-	1	2	1	1	1	1
CO3	3	2	2	-	-	-	1	2	1	1	-	-
CO4	2	1	2	1	1	-	2	-	1	1	2	2
CO5	3	3	3	1	1	-	-	-	1	1	-	-

Guidelines for Continuous Comprehensive Evaluation for Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Case Study	10
2	Assignments – 1 on unit 1,2,3 Assignments – 2 on unit 4,5	10

List of Laboratory Experiments / Assignments		
Sr. No.	**Laboratory Experiments / Assignments**	**CO Mapped**
1	Consider any real life problem and create a MS Project application and prepare a project plan for the same by using project Calendar	CO1
2	Draw the GANTT chart and PERT diagram for Hospital Management System and prepare	CO1
3	Prepare the Work breakdown structure for Hospital Management System	CO1
4	Consider any real life problem and perform the Project Effort Estimation using COCOMO model	CO2
5	Consider any real life problem and prepare the project schedule and estimate time and resources required to complete the project. Determine the resources and budget that you need to run your project. Create a Risk Assessment Matrix using Jira or Project Manager open source tool	CO3
6	Prepare a test plan for Hostel Management System	CO4
7	Binary Search Testing Technique: Basis paths Design, develop, code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results	CO4
8	Triangle Problem Testing Technique: White Box Testing Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program and perform white box testing techniques, execute these test cases and discuss the results	CO4
9	Commission Problem Testing Technique: Black Box Testing Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of black box testing techniques, derive different test cases, execute these test cases and discuss the test results.	CO4
10	Next date program Testing Technique: Defect Repository and Management Design, develop, code and run the program in any suitable language to implement the Next Date function. Analyze it from the perspective of defect repository and maintain it	CO4
11	Create automated test cases for a sample web application using Selenium IDE.	CO5
12	Create a test automation framework for a sample web application using Selenium WebDriver and Java.	CO5

Guidelines for Laboratory Conduction

1. Use of open source software is encouraged.
2. Instructor should identify and set one assignment beyond the scope of syllabus.

3.Operating System recommended :- Windows / Open source Linux or its derivative

Guidelines for Student's Lab Journal

1. The laboratory assignments are to be submitted by student in the form of journal.
2. Journal consists of certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, assessor's sign, Theory-Concept in brief, algorithm, flowchart, conclusion.).
3. Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Course in-charge is highly encouraged to maintain softcopy of all the students assignments

Guidelines for Term work Assessment

Continuous assessment of laboratory work is done based on overall performance of student. Each lab assignment assessment will assign marks based on rubrics. Suggested rubrics for overall assessment include-

Sr. No.	Components for Continuous Assessment	Marks Allotted
1	R1: Timely Submission	10
2	R2: Understanding	10
3	R3: Clarity of Journal Writing	10
	Total Marks:	**30**
Each assignment will get 30 marks. Average of all assignments is converted in to total TW marks		

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: III
MCA223006: Introduction to Constitution

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Theory : 02 hrs/week	**02**	**Continuous Comprehensive Evaluation:20Marks** **EndSem Exam: 30Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and controller and auditor general of India and election commission of India.
- To understand the central and state relation, financial and administrative.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	To acquaint the students with legacies of constitutional development in India and help those to understand the most diversified legal document of India and philosophy behind it	2-Understand
CO2	To understand historical background of the e constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration	1-Knowledge
CO3	To apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions for sustaining democracy.	3-Apply
CO4	To evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women	3-Apply

COURSE CONTENTS

Unit I	**PHILOSOPHY OF THE INDIAN CONSTITUTION**	**5 Hrs**	**CO1**

Constitutional History of India, Role of Dr. B.R. Ambedkar in Constituent Assembly, Preamble –, Source and Objects, Sovereign and Republic , Socialist and Secular, Democratic – Social and EconomicDemocracy, Justice – Social, Economic and Political, Liberty – Thought, Expression, Belief, Faith and Worship , Equality – Status and Opportunity, Fraternity, Human Dignity, Unity an Integrity of the
Nation

Unit II	**FUNDAMENTAL RIGHTS**	**10 Hrs**	**CO2**

Right to equality, Right to freedoms, Right against exploitation, Right to freedom of religion, Cultural and educational rights, Right to property, Right to constitutional remedies

Unit III	**DIRECTIVE PRINCIPLES OF STATE POLICY**	**8 Hrs**	**CO3**

Equal Justice and free legal aid, Right to work and provisions for just and humane conditions of work,

Provision for early childhood, Right to education and SC,ST, weaker section, Uniform Civil Code, Standard of Living, nutrition and public health, Protection and improvement of environment, Separation of Judiciary from executive, Promotion of International peace and security			
Unit IV	**FUNDAMENTAL DUTIES**	**8 Hrs**	**CO4**
Duty to abide by the Constitution, Duty to cherish and follow the noble ideals, Duty to defend the country and render national service, Duty to value and preserve the rich heritage of our composite culture, Duty to develop scientific temper, humanism ,the spirit of inquiry & reform, Duty to safeguard public property and abjure violence, Duty to strive towards excellence			

Text Books

1. D. D. Basu, Introduction to the Constitution of India, LexisNexis
2. Granville Austin, The Constitution of India: Cornerstone of a Nation, Oxford University Press
3. Subhash Kashyap, Our Constitution, National Book Trust M.P. Jain, Indian Constitutional Law, LexisNexis

Reference Books

1. V. N. Shukla, Constitution of India, Eastern Book Company
2. P. M. Bakshi, The Constitution of India, Universal Law Publishing
3. M. V. Pylee, Constitutional Government in India, S. Chand
4. V. S. Khare, Dr. B. R. Ambedkar and India's National Security
5. Brij Kishore Sharma: Introduction to the Indian Constitution, 8th Edition, PHI Learning Pvt. Ltd.
6. Granville Austin: The Indian Constitution: Cornerstone of a Nation (Classic Reissue), Oxford University Press.
7. Subhash C. Kashyap: Our Constitution: An Introduction to India's Constitution and constitutional Law, NBT, 2018.

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	-	-	-	-	1	1	-	1	2	1	-
CO2	-	-	-	-	-	1	1	-	1	2	1	-
CO3	-	-	-	-	-	1	1	-	1	2	1	-
CO4	-	-	-	-	-	1	1	-	1	2	1	-

Guidelines for Continuous Comprehensive Evaluation for Theory Course		
Sr. No.	**Components for Continuous Comprehensive Evaluation**	**Marks Allotted**
1	Group Presentation	10
2	Assignment	10

K. K. Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: III
MCA223007: Mini Project

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Practical : 02hrs/week	01	Term Work : 25 Marks

Course Objectives:

1. Conceptualize knowledge with emphasis on team work, effective communication, critical thinking and problem solving skills.
2. Adapt to a rapidly changing environment by having learned and applied new skills and new technologies.
3. Acquaint with the process of applying basic computer applications and provide solutions to the problems in various application domains.
4. To gain the insight of technical writing.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Identify the real life problem from societal need point of view	1-Remember
CO2	Apply software project management skills during project work.	3-Apply
CO3	Analyze and synthesize the identified problem from technological perspective	4-Analyze
CO4	Build small groups to work effectively in team on medium scale computing projects.	6-Create
CO5	Design and evaluate solutions for complex problems.	6-Create
CO6	Develop communication skills for presentation of project related activities and project report writing	6-Create

Course Execution details

Preamble: Mini Project through Project-based learning is an instructional approach designed to give students the opportunity to develop knowledge and skills through engaging projects set around challenges and problems they may face in the real world. With Mini Project students "investigate and respond to an authentic, engaging, and complex problem, or challenge" with deep and sustained attention. Mini Project is "learning by doing." The truth is, many in education are recognizing we live in a modern world sustained and advanced through the successful completion of projects. In short, If students are prepared for success in life, we need to prepare them for a project-based world. It is a style of active learning and inquiry-based learning. (Reference: Wikipedia). Mini Project will also redefine the role of teacher as mentor in learning process. Along with communicating knowledge to students, often in a lecture setting, the teacher will also to act as an initiator and facilitator in the collaborative process of knowledge transfer and development. The Mini Project model focuses the student on a big open-ended question, challenge, or problem to research and respond to and/or solve. It Brings what students should academically know, understand, and be able to do and requires students to present their problems, research process, methods, and results. Mini Project requires regular mentoring by faculty throughout the semester for successful completion of the idea/project tasks selected by the students per batch. For the faculty involved in Mini Project, teaching workload

of 2 Hrs/week/batch needs to be considered. The Batch should be divided into subgroups of 4 to 5 students. Idea implementation /Real life problem/Complex assignments / activities / projects. under project based learning is to be carried throughout semester and Credit for Mini Project has to be awarded on the basis of internal continuous assessment and evaluation at the end of semester

1. **Formulation of Team and Topic Finalization:** Students should form a group of 3 to 4 members Staff and Students should discuss the relevant problem statement.(Prefer real world problems having some social impact and application) Each team should be allocated a guide. Students should submit Synopsis(should contain Flowchart, Usage of the logic, algorithm, functions and suitable data structure for implementing the solution)
2. **Select any suitable programming platform** (Open source, window, web, mobile applications or any other suitable) Prefer open source technologies for development. Students can select any programming language they have learnt or in which they are competent.
3. **Design and Documentation** SDLC has to be followed for design and development Prepare Analysis Specification Document, Input Specification and Design Specification Documents(use Data Design, DFD, Flowcharts, UML diagrams, Data Dictionary, ER dig etc.) Follow SDD, SRS Provide Test Specifications (test cases, test results, test methodology etc.) Report Generations if needed.
4. **Report and Presentation** Students should present the working model of the project to the guide and panel of the college. They should prepare a report comprising the above mentioned terminologies. Submit Hard copy/Soft copy of the report which should contain certificate signed by guide , HOD and principal (prefer soft copy)

Selection of Project/Problem:

The problem-based project oriented model for learning is recommended. The model begins with the identifying of a problem, often growing out of a question or "wondering". This formulated problem then stands as the starting point for learning. Students design and analyze the problem/project within an articulated interdisciplinary or subject frame. A problem can be theoretical, practical, social, technical, symbolic, cultural, and/or scientific and grows out of students' wondering within different disciplines and professional environments. A chosen problem has to be exemplary. The problem may involve an interdisciplinary approach in both the analysis and solving phases. By exemplarity, a problem needs to refer back to a particular practical, scientific, social and/or technical domain. The problem should stand as one specific example or manifestation of more general learning outcomes related to knowledge and/or modes of inquiry. There are no commonly shared criteria for what constitutes an acceptable project. Projects vary greatly in the depth of the questions explored, the clarity of the learning goals, the content, and structure of the activity.

- A few hands-on activities that may or may not be multidisciplinary.
- Use of technology in meaningful ways to help them investigate, collaborate, analyse, synthesize, and present their learning.
- Activities may include- Solving real life problem, investigation, /study and Writing reports of in depth study, field work

Assessment: The institution/head/mentor is committed to assessing and evaluating both student performance and program effectiveness. Progress of Mini Project is monitored regularly on weekly basis. Weekly review of the work is necessary. During process of monitoring and continuous assessment and evaluation of the individual and the team performance is to be measured. Mini Project is monitored and continuous assessment is done by supervisor /mentor and authorities. Students must maintain an institutional culture of authentic collaboration, self-motivation, peer learning and personal responsibility. The institution/department should support students in this regard through guidance/orientation programs and the provision of appropriate resources and services. Supervisor/mentor and Students must actively participate in assessment and evaluation processes. Group may demonstrate their knowledge and skills by developing a public product and/or report and/or presentation.

1. Individual assessment for each student (Understanding individual capacity, role and involvement in

the project)
2. Group assessment (roles defined, distribution of work, intra-team communication and togetherness). Documentation and presentation Evaluation and Continuous Assessment: It is recommended that all activities should to be recorded regularly, regular assessment of work need to be done and proper documents need to be maintained at college end by both students as well as mentor. Continuous Assessment Sheet (CAS) is to be maintained by all mentors/department and institutes. Recommended parameters for assessment/evaluation and weightage:
3. Idea Inception and Awareness /Consideration of -Environment/ Social /Ethics/ Safety measures/Legal aspects
4. Outcomes of Mini Project / Problem Solving Skills/ Solution provided/ Final product (Individual assessment and team assessment)
5. Documentation (Gathering requirements, design and modeling, implementation/execution, use of technology and final report, other documents)
6. Demonstration (Presentation, User Interface, Usability)
7. Contest Participation/ publication Mini Project workbook will serve the purpose and facilitate the job of students, mentor and project coordinator. It will reflect accountability, punctuality, technical writing ability and work flow of the work undertaken. Note: While planning for the assessment, choose a valid method based on your context. It should be able to understand by both the students as well as the faculty. The student group must follow the principles of Software Engineering (Scoping out the problem, the solution implementation and related documentation). Researching the problem and outlining various approaches is key here and should be emphasized by the tutor and the mentor. Aspects of design thinking (from the point of view of the person facing the problem) are very important. Students should not jump into the technology aspects first. The team can follow the principles of Agile Software Development. The weekly meetings could be used as a Scrum meeting. The tutor and mentor should actively help the students to scope the work and the approach. They must validate the technology choices. If the implementation code is well documented, the project can be continued by subsequent batch – which will help solve a bigger problem

Note: While planning for the assessment, choose a valid method based on your context. It should be able to understand by both the students as well as the faculty. The student group must follow the principles of Software Engineering (Scoping out the problem, the solution implementation and related documentation). Researching the problem and outlining various approaches is key here and should be emphasized by the tutor and the mentor. Aspects of design thinking (from the point of view of the person facing the problem) are very important. Students should not jump into the technology aspects first. The team can follow the principles of Agile Software Development. The weekly meetings could be used as a Scrum meeting. The tutor and mentor should actively help the students to scope the work and the approach. They must validate the technology choices. If the implementation code is well documented, the project can be continued by subsequent batch – which will help solve a bigger problem.

Student's Role in Mini Project

Prepare students for Mini Project before starting the sessions. Students must have ability to initiate the task/idea .they should not be mere imitators. They must learn to think. Students working in Mini Project must be responsible for their own learning. Throughout the Mini Project process, students have to define and analyze the problem, generate learning issues and apply what they have learned to solve the problem and act for them and be free. Students must quickly learn how to manage their own learning, Instead of passively receiving instruction. Students in Mini Project are actively constructing their knowledge and understanding of the situation in groups. Students in Mini Project are expected to work in groups. They have to develop interpersonal and group process skills, such as effective listening or coping creatively with conflicts. Inquiry Skills Students in Mini Project are expected to develop critical thinking abilities by constantly relating: What they read to do? What they want to do with that information? They need to analyze information presented within the context of finding answers. Modeling is required so that the students can observe and build a conceptual model of the

required processes. Formative and summative questions for evaluation: How effective is …….? How strong is the evidence for ……..? How clear is ……? What are the justifications for thinking? Why is the method chosen? What is the evidence given to justify the solution?

Information Literacy Information literacy is an integral part of self- directed learning Information literacy involves the ability to: Know when there is a need for information Identify the information needed to solve a given problem or issue Be able to locate the needed information Use the information to solve the given problem effectively. Skills required by students in information literacy include: How to prepare the search , How to carry out the research, Sorting and assessing of information in general

Collaborative learning It is an educational approach to teaching and learning that involves groups of students working together to solve a problem or complete a project In collaborative learning, learners have the opportunity to talk with peers, exchange diverse beliefs present and defend ideas, as well as questioning other ideas

Interpersonal Skills Interpersonal skills relating to group process are essential for effective problem solving and learning. It is important that students are made aware of these inter personal skills. Consensual decision making skills, Dialogue and discussion skills, Team maintenance skills

Conflict management skills and Team leadership skills. Students who have these skills have a better opportunity to learn than students who do not have these skills and Time Management Resources Students need to have the ability to evaluate the resources used Students have to evaluate the source of the resources used by asking the following questions: How current is it?, Is there any reason to suspect bias in the source? How credible and accurate is it?

Meta-cognitive Skills Students need to reflect on the processes they are using during the learning process, Compare one strategy with another, and evaluate the effectiveness of the strategy used Reflection Skills Reflection helps students refine and strengthen their high-level thinking skills and abilities through self-assessment. Reflection gives students opportunities to think about how they answered a question, made a decision, or solved a problem. What strategies were successful or unsuccessful? , What issues need to be remembered for next time? , What could or should be done differently in the future?

Learning Resources:

Text Books:

1. A new model of problem based learning. By Terry Barrett. All Ireland Society for higher education (AISHE). ISBN:978-0-9935254-6-9; 2017
2. Problem Based Learning. By Mahnazmoallem, woei hung and Nada Dabbagh, Wiley Publishers. 2019.
3. Stem Project based learning and integrated science, Technology, Engineering and mathematics Approach By Robert Capraro, Mary Margaret Capraro

Reference Books:

1. De Graff E, Kolmos A, red: Management of change: Implementation of problem-based and project-based learning in engineering. Rotterdam: Sense Publishers. 2007. 2. Gopalan," Project management core text book",
2. Indian Edition James Shore and Shane Warden, " The Art of Agile Development"

MOOC Courses:

1. https://onlinecourses.nptel.ac.in/noc19_mg30/preview

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: IV
MCA224001: Major Project

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
PR : 18hrs	**18**	**Term Work : 100Marks** **PR: 100Marks** **OR: 100Marks**

Course Objectives:

1. To apply the knowledge to solve realistic problem
2. To understand the concepts of Project Management
3. To understand problem identification, formulation and solution
4. To Understand programming language concepts along with software engineering principles or go through the research work and gather knowledge over the field
5. To work as an individual or in a team and learn professionalism

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Use computer science knowledge to solve real world problems	3-Apply
CO2	Apply professional ethics, cyber regulations and project management principles	3-Apply
CO3	Use effective technical communication for project documentation and demonstration	3-Apply
CO4	Evaluate the various validation and verification methods.	5-Evaluate
CO5	Develop skills to work in a team in multi-disciplinary environment for life-long learning	6-Create
CO6	Design solutions for complex computing problem using modern tools	6-Create

Guidelines

Preamble

An internship/Industrial training/Project work is the form of experiential learning that integrates knowledge and theory learned in the classroom with practical application and skills development in a professional setting. The students can opt for internship/Industrial training/Project work in any industry/academic institute/R&D/PSU/Government or semi government organizations. This caters students, the opportunity to gain valuable applied experience and explore networks in professional fields they are considering for career paths; and give employers the opportunity to guide and evaluate talent. This will not only help students in gaining professional know-how but also benefits, corporate on fresh perspectives on business issues and even discovering future business leaders.

Guidelines:

1. In Major Project with Industrial Internship, the student shall undergo industrial training followed by project work. Student shall apply Software Development Life Cycle to project,

draw design diagrams using tools, implement the system and test it before deployment.

2. Max 2 students are allowed to work on single project.
3. Every student should submit joining letter along with their project synopsis after commencement of semester
4. Progress of project work is monitored regularly on weekly project slot/project day. Regular interval presentations are to be arranged to review and assess the work. During process of monitoring and continuous assessment and evaluation the individual and team performance is to be measured.
5. Project work is monitored and continuous assessment is done by guide and authorities.
6. During final examination internal examiner and External examiners jointly, evaluate the project work.
7. Recommended performance measure parameters may include-Problem definition and scope of the project, Exhaustive and Rational Requirement Analysis, Comprehensive Implementation Design, modelling, documentation, Usability, Optimization considerations(Time, Resources, Costing), Thorough Testing, Project Presentation and Demonstration(ease of use and usability), Presentation of work in the form of Project Report(s), Understanding individual capacity, Role & involvement in the project, among other parameters.
8. The student shall prepare the duly certified final report of project work in standard format for satisfactory completion of the work by the concerned guide and head of the Department/Institute.
9. End semester Exam shall be conducted after submission of Project Report. The evaluation of a student shall be based on his/her performance in entire semester of Project work and Final Presentation and Viva. The mode of evaluation is Orals and Presentation.

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: IV
MCA224002: Technical Seminar

Teaching Scheme:	**Credit Scheme:**	**Examination Scheme:**
Practical : 04 hrs/week	**02**	**Term Work : 50Marks**

Prerequisite Courses, if any: Business Communication

Course Objectives:

8. To explore the basic principles of communication skills.
9. To explore the new trends in recent technologies and research.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	**Bloom's Level**
CO1	Explain the new trends in recent technologies and research.	2 – Understand
CO2	***Use*** communication and writing skills.	3 - Apply

COURSE CONTENTS

Recommended Format of the Seminar Report

1. Title Page with Title of the topic, Name of the candidate & Roll Number, Name of the Guide, Name of the Department, Institution and Academic Year
2. Abstract and Keywords
3. Acknowledgements
4. Table of Contents, List of Figures, List of Tables and Nomenclature
5. Chapters Covering topic of discussion - Introduction, Literature Survey, Details of technology, Analytical and/or experimental work (if any), Discussions and Conclusions, Bibliography/References

Guidelines:

The nature of a seminar course is to explore areas of interest common to both the students and the instructor. The topic must be selected in consultation with the institute guide. The explorations are designed to help the students grow toward specific goals. Seminar is an advanced level course designed to allow students to explore advanced topics.
Each student will make a presentation on their selected area preferably keeping track with recent technological trends and development.
Each student will make a seminar presentation in the term making use of audio/visual aids for duration of 20 – 25 minutes
Each student has to submit two copies of the seminar report in a prescribed format duly signed by the guide and Head of the department.
A panel of staff members of the institute will assess the seminar internally

Guidelines for Assessment:

Panel of staff members along with a guide would be assessing the seminar work based on these parameters -Topic, Contents and Presentation, Regularity, Punctuality and Timely Completion, Question and Answers, Report, Paper presentation/Publication, Attendance and Active Participation

Reference Books

References Books

1. Rebecca Stott, Cordelia Bryan, Tory Young, "Speaking Your Mind: Oral Presentation and Seminar Skills (Speak-Write Series)", Longman, ISBN-13: 978-0582382435
2. Johnson-Sheehan, Richard, "Technical Communication", Longman. ISBN0-321-11764-6
3. VikasShirodkar,"FundamentalskillsforbuildingProfessionals",SPD,ISBN978-93-5213-146- 5

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	3	2	3	2	1	2	3	3	3	1
CO2	3	3	3	2	3	2	1	2	3	3	3	1

K.K.Wagh Institute of Engineering Education and Research, Nashik
(Autonomous from Academic Year 2022-23)

S. Y. M.C.A.
Pattern 2022 Semester: IV
MCA224003: Research Paper / MOOC

Teaching Scheme:	Credit Scheme:	Examination Scheme:
Practical:04hrs/week	2	Term Work : 50 Marks

Course Objectives:

1. To promote learning additional skills anytime and anywhere
2. To enhance teaching and learning on campus and online
3. To inculcate the quality of lifelong learning
4. To publish the research/ study undertaken for a specific identified problem.

Course Outcomes: On completion of the course, students will be able to–

	Course Outcomes	Bloom's Level
CO1	Acquire additional knowledge and skills	3- Apply
CO2	write a complete research paper	6-Create

Guidelines

Research Paper

The course is designed to cover techniques that can be applied to academic writing of research papers. The student will practice techniques by drafting a research paper with support from other class members and the instructor.

The research paper is intended to provide students with the opportunity to more fully explore class discussion topic, as well as examine it from a more empirical perspective.

Students will undertake review of literature of research papers and submit a research paper as final submission.

Note : Each faculty ought to guide the students to provide a research paper and literature review

MOOCs (Massive Open Online Courses)

This course aims to create an excellent opportunity for students to acquire the necessary skill set for employability through massive online courses where the rare expertise of world famous experts from academics and industry are available. MOOCs (Massive Open Online Courses) provide affordable and flexible way to learn new skills. MOOCs are courses delivered online and accessible to all for free.

- Massive because enrollments are unlimited and can run into hundreds of thousands.
- Open because anyone can enroll — that is, there is no admission process. λ Online because they are delivered via the internet.
- Course because their goal is to teach a specific subject.

MOOCs typically comprise video lessons, readings, assessments, and discussion forums.

SWAYAM is a programme initiated by Government of India and designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. The objective of this effort is to take the best teaching learning resources to all, including the most disadvantaged. SWAYAM seeks to bridge the digital divide for students who have hitherto remained untouched by the digital revolution and have not been able to join the mainstream of the knowledge economy.

NPTEL- National Programme on Technology Enhanced Learning is a project of MHRD initiated by seven Indian Institutes of Technology (Bombay, Delhi, Kanpur, Kharagpur, Madras, Guwahati and Roorkee) along with the Indian Institute of Science, Bangalore in 2003, to provide quality education to anyone interested in learning from the IITs. The main goal was to create web and video courses in all major branches of engineering and physical sciences at the undergraduate and postgraduate levels and management courses at the postgraduate level.

Spoken Tutorial is an initiative of national mission on education through ICT, MHRD, Govt. of India to promote IT literacy through Open Source Software. It is a multi-award winning educational content portal. Here one can learn various Free and Open Source Software all by oneself. Anybody with a computer and a desire for learning can learn from any place, at any time and in any language of their choice.

MOOCs course provider like, SWYAM, NPTEL, EDX, Coursera, Udemy, Udacity or similar ones can help the students in acquiring knowledge and also advancement in career.

Suggested List :

- R Programming
- LaTex
- Data Mining
- Any other course suggested by Institute

About Course and Grade

Non Credit course is compulsory. No grade points are associated with non-credit courses and are not accounted in the calculation of the performance indices SGPA & CGPA. Result of assessment will be PP or NP. Set of non-credit courses offered is provided. Conduction and assessment of performance in said course is to be done at institute level. PP and NP Grade - The student registered and completed

non credit Research Paper/MOOC course shall be awarded the grade PP after satisfactory completion of credit course and shall be included in the Semester grade report for that course, provided student has the minimum attendance as prescribed by the institute and satisfactory internal assessment performance and secured a passing grade in that course. Student who is unable to complete Research Paper/MOOC course will be awarded as NP grade.

Guidelines for conduction

Research Paper:

1. Students will have to submit the copy of published paper before the end of the semester.
2. Students should publish the research paper in reputed National/ International Journal/Conference

MOOC:

Students have to enroll themselves for any one course which will be on going and complete the assignments. Grades will be given on the basis of submitted assignments and marks obtained. If student wants to earn a verified certificate, he/she will have to fill the online exam registration form and take the proctored exam conducted by NPTEL/Spoken Tutorial in person at any of the designated exam centers.

ACADEMIC HONESTY AND INTEGRITY:

Academic honesty and integrity are important values in the educational process at KKWIEER.

Examples of academic dishonesty include but are not limited to:

• Plagiarism

• Cheating on exams and other assignments

• Academic fraud such as submitting work for multiple purposes or submitting false data Academic dishonesty in any form is a serious offense against the academic community.

Acts of academic dishonesty or fraud will be addressed according to the KKWIEER Academic Integrity Policy.

Reference Books

1.Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press

2.Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

3.Jari Saramäki, How to Write a Scientific Paper: An Academic Self-Help Guide for PhD Students, Amazon Digital Services LLC - KDP Print US, 2018.

Learning Resources:

1. Swayam- https://swayam.gov.in/
2. NPTEL- https://onlinecourses.nptel.ac.in/
3. Spoken Tutorial - https://spoken-tutorial.org/tutorial-search
4. MOOC- http://mooc.org/
5. Edx - https://www.edx.org/
6. Coursera- https://www.coursera.org/
7. IEEE- https://ieeexplore.ieee.org/
8. Elsevier (Science Direct)- http://www.sciencedirect.com/

CO-PO Mapping:

Strength of CO-PO Mapping												
	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	3	3	3	3	2	3	1	2	2	2	3
CO2	1	1	1	1	3	2	3	-	2	2	1	1