Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Programme: Master of Computer Applications

Scheme of Instructions: Third Year MCA

Semester – V

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Course Credits	EXAM SCHEME				
									CT-1	CT-2	TA/CA	ESE	TOTAL
1	PCC	MC1501	Cloud Computing	3	-	-	3	3	15	15	10	60	100
2	PCC	MC1502	Data Science	3	-	-	3	3	15	15	10	60	100
3	PEC	MC15*3	Elective-II	3	-	-	3	3	15	15	10	60	100
4	PEC	MC15*4	Elective-III	3	-	-	3	3	15	15	10	60	100
5	ESC	MC1505	Internet of Things Lab		2	2	4	3	-	-	50	-	50
6	PCC	MC1506	Data Science Lab	-	-	2	2	1	-	-	50	-	50
7	PCC	MC1507	Scripting Language Lab	-	2	4	6	4	-	-	50	50	100
8	P/S	MC1508	Software Development Project Lab	-	2	4	6	4	-	-	100	50	150
			Total	**12**	**06**	**12**	**30**	**24**	**60**	**60**	**290**	**340**	**750**

L- Lecture T-Tutorial P-Practical

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2 ESE- End Semester Examination (For Laboratory End Semester performance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	MCC (Mandatory Courses)	Project / Seminar / Industrial Training
Credits	--	--	03	11	06	--	--	04
Cumulative Sum	12	--	23	72	09	--	Yes	08

PROGRESSIVE TOTAL CREDITS :100+24= 124

Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Programme: Master of Computer Applications

Scheme of Instructions: Third Year MCA

Semester – VI

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs / Wk	Course Credits	EXAM SCHEME				
									CT-1	CT-2	TA/CA	ESE	TOTAL
1	PCC	MC1601	Industrial Project	-	-	-	30	15	-	-	100	100	200
			Total	**-**	**-**	**-**	**30**	**15**	**-**	**-**	**100**	**100**	**200**

L- Lecture T-Tutorial P-Practical

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment

CT2- Class Test 2 ESE- End Semester Examination (For Laboratory End Semester performance)

Course Category	HSMC (Hum., Soc. Sc, Mgmt.)	BSC (Basic Sc.)	ESC (Engg. Sc.)	PCC (Programme Core courses)	PEC (Programme Elective courses)	OEC (Open Elective courses from other discipline)	MCC (Mandatory Courses)	Project / Seminar / Industrial Training
Credits	00	--	--	--	00	--	--	15
Cumulative Sum	12	--	23	72	09	--	--	23

PROGRESSIVE TOTAL CREDITS :124+15=139

List of PROGRAM ELECTIVE courses:

Elective – I		Elective – II		Elective – III	
MC1303	Digital Forensics	MC1503	Artificial Intelligence	MC1504	Multimedia Systems
MC1313	Embedded Systems	MC1513	Soft computing	MC1514	Mobile Technologies
MC1323	Distributed Systems	MC1523	Business Intelligence	MC1524	Software Defined Networks
MC1333	Object oriented modelling and design	MC1533	Optimization Techniques	MC1534	Applied Algorithms

COMMON INSTRUCTIONs

Departments shall suggest& execute

1. *Bridge courses* for the students who may be *admitted in Autonomous mode from University mode*.
2. *MOOCs* for students adapting *Industry Mode*to fulfil the credit requirements. Copy of certificates / grade card shall be submitted to Controller of Examinations, GCE Karad through Program Coordinator prior to ESE.

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1501: Cloud Computing

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	Distinguish between different types of architectures and services in the cloud Computing.
2.	Understanding management in cloud computing.
3.	Applying the cloud technology in real life application development.
4.	Analyze different security issues and challenges in cloud computing.

	Course Contents	Hours
Unit 1	**Basics of Cloud Computing:** Overview, Applications, Intranets and the Cloud. Your Organization and Cloud Computing- Benefits, Limitations, Security Concerns. Software as a Service (SaaS)- Understanding the Multitenant Nature of SaaS Solutions, Understanding SOA. Platform as a Service (PaaS)-IT Evolution Leading to theCloud, Benefits of Paas Solutions, Disadvantages of PaaS Solutions. Infrastructure as a Service(IaaS)-Understanding IaaS, Improving Performance through Load Balancing, System and StorageRedundancy, Utilizing Cloud-Based NAS Devices, Advantages, Server Types.	**(08)**
Unit 2	**Data Storage and Security in Cloud:** Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo Cloud data stores: Datastore and Simple DB, Cloud Storage-Overview, Cloud Storage Providers. Securing the Cloud- General Security Advantages of Cloud-Based Solutions, Introducing Business Continuity and Disaster Recovery. Disaster Recovery- Understanding the Threats.	**(08)**
Unit 3	**Virtualization:** Implementation Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Types of Hypervisors, Virtualization of CPU, Memory, and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Center Automation. Common Standards: The Open Cloud Consortium, Open Virtualization Format, Standards for Application Developers: Browsers (Ajax), Data (XML, JSON), Solution Stacks (LAMP and LAPP),Syndication (Atom, Atom Publishing Protocol, and RSS), Standards for Security.	**(06)**
Unit 4	**Cloud Service Providers:** Amazon Web Services-Elastic Compute Cloud (EC2), Simple Storage Service (S3), Simple Queue Service (SQS), Elastic Block Storage (EBS), Elastic Load Balancing (ELB), SimpleDB, Relational Database Service (RDS), Virtual Amazon Cloud, Google- AppEngine, Google Storage, Windows Azure, Rackspace Cloud	**(06)**
Unit 5	**Cloud Applications:** Business and Consumer Applications- CRM & ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming, E-Commerce Applications, , Cloud for e-Governance, Scientific Applications- Healthcare, Biology, Geoscience etc.	**(06)**
Unit 6	**Future of Cloud Computing:** How the Cloud Will Change Operating Systems, Location-Aware Applications, Intelligent Fabrics, Paints, and More, The Future of Cloud TV, Future of Cloud-Based Smart Devices, Faster Time to Market for Software Applications, Home-Based Cloud Computing, Mobile Cloud, Autonomic Cloud Engine, Multimedia Cloud, Energy Aware Cloud Computing, Jungle Computing. Future Research Directions and Challenges in Cloud Computing, Case Studies.	**(06)**

Text Books

1.	Dr. Kris Jamsa, " Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more" , Wiley Publications, ISBN: 978-0-470-97389-9
2.	Cloud Computing: Principles and Paradims, RajkumarBuyya, James Broberg, Andrzej Goscinski, Wiley Publication, 1st Edition
3.	Mastering Cloud Computing, RajkumarBuyya, Christian Vecchiola, S ThamaraiSelvi, McGraw Hill Pub., 1 e/d
4.	Gautam Shrof, "ENTERPRISE CLOUD COMPUTING Technology Architecture, Applications, Cambridge University Press, ISBN: 9780511778476

Reference Books	
1.	Cloud Computing Insight into New-Era Infrastructure, Dr. Kumar Saurabh,Wiley India Pvt. Ltd., 1st Edition
2.	Cloud Computing: A Practical Approach, Anthony T. Velte, Tata McGraw Hill, 2009
3.	Guide to Cloud Computing: Principals and Practices, Richard Hill, Laurie Hirsch, Peter Lake, SiavashMoshiri,Springer, 1st Edition
4.	Enterprise Cloud Computing,Gautam Shroff, Cambridge, 1st Edition
5.	Cloud Security and Privacy, Tim Mather, Subra K, Shahid L.,Oreilly, 1st Edition

Useful Links	
1.	http://nptel.ac.in/courses/106106129/28
2.	https://cloudacademy.com/courses/
3.	https://www.lynda.com/Cloud-Computing-training-tutorials/1385-0.html
4.	http://scpd.stanford.edu/search/publicCourseSearchDetails.do?method=load&courseId=11815

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√				√	√		√	√	
CO 2		√	√	√		√			√	
CO 3	√			√	√	√	√	√		√
CO 4	√		√					√	√	√

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember				
Understand	02	02	02	10
Apply	05	05	03	20
Analyse	04	04	03	20
Evaluate	04	04	02	10
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1502: Data Science

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	Understanding of Data Science for and the skillset needed to be a Data Scientist
2.	Understanding different tools for Data Science.
3.	To Apply basic machine learning algorithms (Linear Regression, k-Nearest Neighbors (k-NN), k-means, Naive Bayes) for predictive modeling.
4.	To Create effective visualization of given data (to communicate or persuade).

	Course Contents	Hours
Unit 1	**Introduction:** What is Data Science? - Big Data and Data Science hype – and getting past the hype - Why now? – Datafication - Current landscape of perspectives - Skill sets needed, **Statistical Inference** - Populations and samples - Statistical modeling, probability distributions, fitting a model - Intro to R	**(08)**
Unit 2	**Exploratory Data Analysis and the Data Science Process** - Basic tools (plots, graphs and summary statistics) of EDA - Philosophy of EDA - The Data Science Process - Case Study: RealDirect (online real estate firm)	**(05)**
Unit 3	**Three Basic Machine Learning Algorithms** - Linear Regression - k-Nearest Neighbors (k-NN) - k-means**, One More Machine Learning Algorithm and Usage in Applications** - Motivating application: Filtering Spam - Why Linear Regression and k-NN are poor choices for Filtering Spam - Naive Bayes and why it works for Filtering Spam - Data Wrangling: APIs and other tools for scrapping the Web	**(07)**
Unit 4	**Feature Generation and Feature Selection (Extracting Meaning From Data)** - Motivating application: user (customer) retention - Feature Generation (brainstorming, role of domain expertise, and place for imagination) - Feature Selection algorithms – Filters; Wrappers; Decision Trees; Random Forests	**(07)**
Unit 5	**Recommendation Systems:** Building a User-Facing Data Product - Algorithmic ingredients of a Recommendation Engine - Dimensionality Reduction - Singular Value Decomposition - Principal Component Analysis - Exercise: build your own recommendation system **Mining Social-Network Graphs** - Social networks as graphs - Clustering of graphs - Direct discovery of communities in graphs - Partitioning of graphs - Neighborhood properties in graphs	**(08)**
Unit 6	**Data Visualization** - Basic principles, ideas and tools for data visualization - Examples of inspiring (industry) projects - Exercise: create your own visualization of a complex dataset **Data Science and Ethical Issues** - Discussions on privacy, security, ethics - A look back at Data Science - Next-generation data scientists	**(05)**

Text Books

1.	Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly. 2014.

Reference Books

1.	Jure Leskovek, AnandRajaraman and Je_rey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. (free online)
2.	Kevin P. Murphy. Machine Learning: A Probabilistic Perspective. ISBN 0262018020. 2013.
3.	Foster Provost and Tom Fawcett. Data Science for Business: What You Need to Know about Data Mining and Data-analytic Thinking. ISBN 1449361323. 2013.
4.	Trevor Hastie, Robert Tibshirani and Jerome Friedman. Elements of Statistical Learning, Second Edition. ISBN 0387952845. 2009. (free online)
5.	Avrim Blum, John Hopcroft and Ravindran Kannan. Foundations of Data Science.
6.	Mohammed J. ZakiandWagnerMiera Jr. Data Mining and Analysis: Fundamental Concepts and Algorithms. Cambridge University Press. 2014.
7.	Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. ISBN 0123814790. 2011.

Useful Links			
1.	https://machinelearningmastery.com/		

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√		√	√	√			√	√	√
CO 2		√	√		√		√		√	
CO 3	√			√	√	√	√	√		√
CO 4										

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	-	10
Understand	5	5	2	10
Apply	5	5	3	20
Analyse	-	-	-	-
Evaluate	-	-	2	20
Create	-	-	3	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1503: Elective-II Artificial Intelligence

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	Identify problems that are amenable to solution by AI methods.
2.	Identify appropriate AI methods to solve a given problem.
3.	Formalise a given problem in the language/framework of different AI methods.
4.	Implement basic AI algorithms.

	Course Contents	Hours
Unit 1	**Introduction to Al And Production Systems:** Introduction to AI-Problem formulation, Problem Definition -Production systems, Problem characteristics, Production system characteristics	**(04)**
Unit 2	**Problem solving methods:** Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction, Means Ends Analysis	**(04)**
Unit 3	**Representation of Knowledge** Knowledge representation using Predicate Logic - representation function and Isa relationships, computable functions and predicates, Resolution, Knowledge representation using Rules- Procedural vs Declarative knowledge, Logic Programming, Forward vs backward reasoning, Matching	**(08)**
Unit 4	**Statistical Reasoning:** Probability and Bayes' Theorem, Rule value approach, Fuzzy reasoning Bayesian Theory-Bayesian Network, Dempster - Shafer theory	**(08)**
Unit 5	**Planning And Machine Learning:** Planning – Classical planning problem, Components, Goal Stack, Nonlinear planning, Hierarchical Planning Machine Learning - Learning Process, Learning Methods, Feature extraction, clustering, Artificial Neural networks, Self Organization Map, Regression, Hidden Markov Models	**(08)**
Unit 6	**New trends in AI:** Architecture of expert systems, Roles of expert systems - Knowledge Acquisition, Typical expert systems – MYCIN & MOLE, Expert systems shells	**(08)**

Text Books

1.	Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Second Edition, Mc Graw Hill- 2008
2.	Stuart Russel,PeterNorvig, "Artificial Intelligence – A Modern Approach", Second Edition, PHI/Pearson Education.

Reference Books

1.	Tom Mitchell, "Machine Learning", 2nd Edition, MGH
2.	Simon Hhaykin, "Neural networks - A comprehensive foundations", Pearson Education 2nd Edition 2004.

Useful Links

1.	https://www.youtube.com/watch?v=VqK8XxWImRs, Rule Based Expert System, IIT Kharagpur
2.	http://iiscs.wssu.edu/drupal/node/3659, Artificial Intelligence: Video Lectures

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√			√	√			√	√	√
CO 2		√	√	√	√		√		√	
CO 3	√		√	√	√	√	√	√		√
CO 4		√			√		√		√	

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	-	10
Understand	5	5	2	10
Apply	5	5	3	20
Analyse	-	-	-	-
Evaluate	-	-	2	20
Create	-	-	3	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1513: Elective-II Soft computing

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2.	Understand artificial neural networks and fuzzy theory from an engineering perspective.
3.	To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

	Course Contents	Hours
Unit 1	**Introduction:** Adaptive systems and Neural Networks, the nature of computation in human brain,a historical tour of brain science, inspiration of neural networks, classical AI and neural networks, difference between soft computing and hard computing.	**(08)**
Unit 2	**Artificial Neural Networks:** Introduction, Fundamental concept, Evolution of Neural Networks, Basic Models of Artificial Neural Networks, Important Terminologies of ANNs, McCulloch-Pitts Neuron, Linear Separability, Hebb Network. Supervised Learning Network: Perceptron Networks, Adaline, Multiple Adaptive Linear Neurons, Back-Propagation Network, And Radial Basis Function Network.	**(08)**
Unit 3	**Introduction to Fuzzy logic ,Classical sets and Fuzzy sets:** Introduction to fuzzy logic, Classicalsets (operations, properties, function mapping), Fuzzysets (operations, properties), fuzzy relations.	**(08)**
Unit 4	**Evolutionary Algorithms:** The hybrid way, Inspiration for evolutionary algorithms, Basic terminology from biology, Evolutionary algorithms: definition and streams, EA's solve optimization problems. **Swarm Intelligence:** Particle Search Optimization, Artificial Bee colony search, Ant colony optimization.	**(08)**
Unit 5	Genetic Algorithm: Introduction, Biological background, Traditional optimization and search techniques, Genetic Algorithm and search space, Genetic Algorithm vs Traditional Algorithms, Basic Terminologies Genetic Algorithm, Operations in Genetic Algorithm.	**(04)**
Unit 6	**Applications of Soft Computing:** A fusion approach of multispectral images with SAR (Synthetic Aperture Radar), GA Based Internet Search Technique; Soft Computing Based Hybrid Fuzzy Controllers.	**(04)**

Text Books

1.	Satish Kumar, Neural networks: A classroom approach, Tata McGraw Hill, 2011.
2.	S. N. Sivanandam, S.N.Deepa "Principles of Soft Computing", Wiley Publication, 2 nd edition, 2011. (Unit II, III, V, VI)

Reference Books

1.	David E. Goldberg , Genetic Algorithms in Search, Optimization, and Machine 30 Learning, Addison-Wesley, 1989
2.	B. Yegnanarayana, Artificial Neural Networks, Printice Hall India, 1999.
3.	S.Rajasekaran, G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 1 st edition, 2003
4.	George Klir, Bo Yuan "Fuzzy sets and Fuzzy logic" PHI, 1st edition

Useful Links

1.	
2.	
3.	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√		√			√	√	√	√	√
CO 2		√	√		√		√			√
CO 3		√		√	√	√		√	√	

Assessment Pattern**(with revised Bloom's Taxonomy)**

Knowledge Level	CT 1	CT 2	TA	ESE
Remember				
Understand				
Apply				
Analyse				
Evaluate				
Create				
TOTAL				

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1523: Elective-II Business Intelligence

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	Use BI systems and technology to support decisionmaking
2.	Design and build BI applications based on users'needs.
3.	Identify business and technical requirements for a BI solution.

	Course Contents	Hours
Unit 1	**Business Intelligence:** Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence	**(08)**
Unit 2	**Knowledge Delivery:**The business intelligence user types, Standard reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports and Self-Service Reporting, Visualization:Charts, Graphs, Widgets, ScorecardsandDashboards, Geographic Visualization	**(08)**
Unit 3	**Efficiency:** Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis	**(08)**
Unit 4	**Mathematical models for decision making:** Structure of mathematical models, Development of a model, Classes of models, Notes and readings.	**(05)**
Unit 5	**M-Commerce** : Introduction to m-commerce :Emerging applications, different players in m-commerce, m-commerce life cycle Mobile financial services, mobile entertainment services, and proactive service management	**(06)**
Unit 6	**Business Intelligence Applications:** Marketing models – Logistic and Production models – Case studies.	**(05)**

Text Books

1.	Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", 1st edition, Wiley Publications,2009.
2.	Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", 1stedition, Addison Wesley,2003.

Reference Books

1.	David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager‟s Guide", Second Edition,2012.
2.	Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", 1st edition, McGraw-Hill,2007

Useful Links

1.	https://www.youtube.com/watch?v=-j5J7lXav7Y,BusinessIntelligence Demonstration, Darwins Hamster
2.	http://www.kdnuggets.com/2014/09/most-viewed-data-mining-talks-videolectures.htmlData Mining, Grant Marshall,KDnuggest

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√		√			√	√	√	√	√
CO 2		√	√		√		√			√
CO 3	√		√	√	√	√		√	√	

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	3	3	-	10
Understand	4	4	2	10
Apply	5	5	3	20
Analyse	-	-	2	-
Evaluate	3	3	-	20
Create	-	-	3	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1533 : Elective-II Optimization Techniques

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	Student should be able to apply optimization techniques to get better outcomes.
2.	Student should be able to apply optimization techniques for the organizational business activities.
3.	Be familiar with various types optimization techniques.

	Course Contents	Hours
Unit 1	**Linear Programming problem:** Mathematical formulation, assumptions in linear programming, graphical method of solution, simplex method, Big-M method and Two phase method, Dual simplex method.	**(06)**
Unit 2	**Integer Programming:** Introduction, Gomory's cutting plane method, Fractional cut method-Mixed integer and branch and bound techniques.	**(06)**
Unit 3	**Transportation Problem:** General transportation problem, Finding an initial basic feasible solution, Loops in transportation tables, Degeneracy, Optimality method-MODI method. **Assignment Problem:** Hungarian Method, Traveling salesman problem.	**(07)**
Unit 4	**Game theory:** Introduction, two-person zero-sum games, some basic terms, the max mini minimax principle, games without saddle points-Mixed Strategies, graphic solution of 2 * n and m*2 games, dominance property. **Simulation:** Introduction, Definition of Monte-Carlo Simulation. .	**(07)**
Unit 5	**Dynamic Programming** Introduction, The Recursive equation approach, Algorithm, Solution of a L.P.P by Dynamic Programming. **Sequencing Models:** Processing n jobs through 2 machines, n jobs through 3 machines, two jobs through m machines. **Networking Analysis:** CPM & PERT – Network minimization, shortest route problem, maximal-flow problem, Project scheduling, critical path calculations, PERT calculation.	**(08)**
Unit 6	**Queuing Theory:** Introduction, Queuing system, Elements of Queuing system, Characteristics of Queuing system, Classification of Queuing Models, Poisson Queuing systems -Model I (M/M/1): (∞:FIFO)-Characteristics of Model1 and waiting time characteristics. Characteristics of (M/M/1):(N/FIFO), (M/M/C):(∞ /FIFIO), (M/M/C):(N/FIFO)-all without derivation	**(06)**

Text Books

1.	1. Operation Research-An introduction by Hamdy A Taha, Prentice Hall.

Reference Books

1.	Introduction to Management Science, Anderson, Thomson Learning, 11Edn.
2.	Operation Research Applications and Algorithms, Winston, Thomson Learning, 4Edn.
3.	Introduction to Operation Research by Hiller/Lieberman. McGraw Hill.
4.	Operation Research by Dr. Kalavathy. S. Vikas Publishing

Useful Links

1.	https://nptel.ac.in/syllabus/111105039.pdf Prof. A. Goswami, IIT Kharagpur
2.	https://nptel.ac.in/course.php 106108101 Dr. Joydeep Dutta ,IIT Kanpur
3.	www.ocw.mit.edu

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√		√	√	√			√	√	√
CO 2		√	√		√		√		√	
CO 3	√			√	√	√	√	√		√

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	-	10
Understand	5	5	2	10
Apply	5	5	3	20
Analyse	-	-	-	-
Evaluate	-	-	2	20
Create	-	-	3	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1504 : Elective-III Multimedia Systems

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	To apply basic concepts of multimedia system.
2.	To learn various methods of signal processing on multimedia systems.
3.	To develop ability to design various digital multimedia systems.

	Course Contents	Hours
Unit 1	**Introduction to Multimedia** Goals, objectives, and characteristics of multimedia, Multimedia building blocks, Multimedia architecture, Multimedia Applications Media Entertainment, Media consumption, web-based applications, e-learning and education	**(08)**
Unit 2	**Text and Image Processing:** **Text**: Text file formats: TXT, DOC; RTF, PDF, PS **Text compression:** Huffman coding, LZ & LZW **Image**: Basic Image fundamentals, Image File formats - (BMP, TIFF, JPEG, GIF) Image processing cycle- Image acquisition, storage ,Communication,and display, Image Enhancement, **Image Compression:** Types of Compression: Lossless & Lossy Lossless: RLE, Shannon - Fano algorithm, Arithmetic coding. Lossy: Vector quantization, Fractal Compression Technique, Transform coding and Hybrid: JPEGDCT	**(08)**
Unit 3	**Audio and Video Processing:** AUDIO: Nature of sound waves, characteristics of sound waves, psycho-acoustic, MIDI, digital audio, CD formats. **Audio file formats**: WAV, AIFF, VOC, AVI, MPEG Audio File formats, RMF, WMA Audio compression techniques: DM, ADPCM and MPEG **Video**: Video signal formats, Video transmission standards: EDTV, CCIR, CIF, SIF, HDTV, digitization of video, **Video file formats**: MOV, Real Video, H-261, H-263, Cinepack, Nerodigtal,Video editing, DVD formats, MPEG.	**(06)**
Unit 4	**Multimedia Information System:** Operating System Support for Continuous Media-Introduction, Limitations, Middleware System Services Architecture, Multimedia Devices, Presentation Services, and the User Interface, Multimedia File Systems and Information Models.	**(08)**
Unit 5	**Multimedia Communications Systems:** Multimedia Services over the Public Network: Requirements, Architectures, and Protocols, Multimedia Interchange, Multimedia Conferencing	**(06)**
Unit 6	**Future Directions:** High Definition Television and Desktop Computing, Knowledge-Based Multimedia Systems	**(06)**

Text Books

1.	Multimedia Systems, ed. by John F. Koegel Buford, 13th edition (ACM Press/Addison- Wesley, 1994)
2.	Fundamentals of Multimedia: Ze-Nian Li & Mark S. Drew, 2nd edition, Pearson Prentice Hall, 2004

Reference Books

1.	Digital Signal Processing: Steven W. Smith, 2nd edition, California Technical Publishing, 1999
2.	Tharkar, Multimedia Systems Design, 1st edition, Prentice Hall India Learning Private Limited
3.	Ashok Banerji, AnandaGhosh, “Multimedia Technologies”, ISBN: 9780070669239.

Useful Links

1.	http://nptel.ac.in/courses/117105083/1 , Multimedia Systems, IIT Kharagpur
2.	http://freevideolectures.com/Course/2652/CSE-40373-Multimedia-Systems , Video Lectures, Spring 2009 , Prof.Surendar Chandra

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√		√	√	√			√	√	√
CO 2		√	√		√		√		√	
CO 3	√			√	√	√	√	√		√

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	-	10
Understand	5	5	2	10
Apply	5	5	3	20
Analyse	-	-	-	-
Evaluate	-	-	2	20
Create	-	-	3	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1514: Elective-III Mobile Technologies

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	Student should aware of understanding of design issues associated with operating systems.
2.	Student should aware of concepts of memory management including virtual memory.
3.	Be familiar with various types of operating systems including Unix.

	Course Contents	Hours
Unit 1	**Introduction to Mobile Computing** Concept of Mobile Communication, Different generations of wireless technology, Basics of cell, cluster and frequency reuse concept, Noise and its effects on mobile, Understanding GSM and CDMA, Basics of GSM architecture and services like voice call, SMS, MMS, LBS, VAS, Different modes used for Mobile Communication, Architecture of Mobile Computing(3 tier),	**(08)**
Unit 2	**Design mobile computing architecture**: Characteristics of Mobile Communication, Application of Mobile Communication, Security Concern Related to Mobile Computing, Middleware and Gateway required for mobile Computing, Making Existing Application Mobile Enable, Mobile IP, Basic Mobile Computing Protocol, Mobile Communication via Satellite • Low orbit satellite • Medium orbit satellite • Geo stationary satellite Satellite phones.	**(08)**
Unit 3	**Introduction to Android**: Overview of Android, What does Android run On – Android Internals, Android for mobile apps development, Environment setup for Android apps Development, Framework - AndroidSDK, Eclipse, Emulators – What is an Emulator / Android AVD? Android Emulation – Creation and set up, First Android Application	**(08)**
Unit 4	**Introduction to iOS:** iOS Architecture, Environment Setup, Delegates, UI Controls, UI Views, UI Bars, Graphics, Audio & Video, Accessing Maps in Applicaitons, File Handling, Notifications, Location	**(08)**
Unit 5	**Introduction to Mobile Networks (Telecom Fundamentals & 2G, 3G)** : Telecom Basics & Cellular principles, Analog & digital modulations and multiple access Techniques, GSM(2G), GSM Air interface &channel structure, Protocol Basics, Call Processing: Message and signaling flows, Handover Scenarios Migration from 2G to 3G, UMTS Services and Applications, Air Interface dynamics and various Concepts, Call Processing, High Speed Packet Access (HSDPA, HSUPA)	**(04)**
Unit 6	**Long Term Evolution (LTE), VOIP, SIP, IMS and OSS(Billing):** Improvements & Evolution from 3G, LTE Architecture, LTE protocol architecture, services and applications, LTE Protocols, LTE Interfaces, LTE Air Interfaces, LTE Call Sequences, Handover Scenarios, LTE Integration with IMS, WLAN, WiFi, Wimax, 3GPP, non-3GPP access systems, Voice solutions in LTE: CSFB and VOLTE. Introduction to VOIP, Introduction to H.323, SIP, MGCP, Session Initiation protocol (SIP) & SDP, RTP, RTCP, IP Multimedia Subsystem (IMS), Kenon (online & offline) billing	**(04)**

Text Books

1.	Building Android Apps In Easy Steps, 1st Edition, McGraw-Hill Education.
2.	Mobile Computing (Technology, Applications and Service Creation) Asoke. K Talukder and Roopa R. Yavagal.TATAMcGRAW HILL, 2nd Edition
3.	Frank Adelstein, Fundamentals of Mobile and Pervasive Computing, TATAMcGRAW HILL, 3rd Edition

Reference Books

1.	Neil Smyth, 'Android Studio Development Essentials', 6th edition by Neil Smyth
2.	Michael Owens, ' The Definitive Guide to SQL Lite' 2nd Apress Berkely, CA, USA ©2010
3.	L Murphy , 'Beginning Android Mark',1st edition, Wiley India Pvt Ltd
4.	Y Hashimi and Satya Komatineni, 'Pro Android Sayed,1st edition, Wiley India Pvt Ltd
5.	Reto Meier, 'Professional Android to Application Development',2nd edition, Wiley India Pvt Ltd

Useful Links

1.	http://www.tutorialpoints.com/android/ developer.android.com/training/basics/firstapp
2.	http://pl.cs.jhu.edu/oose/resources/android/Android-Tutorial.pdf
3.	https://www.tutlane.com/tutorial/ios/ios-tutorial

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√	√	√	√	√			√	√	√
CO 2		√	√		√		√		√	
CO 3				√		√	√	√		√

Assessment Pattern(with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	-	10
Understand	5	5	2	10
Apply	5	5	3	20
Analyse	-	-	-	-
Evaluate	-	-	2	20
Create	-	-	3	-
TOTAL	15	15	10	60

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Third Year (Sem – V) M. C. A.

MC1524: Elective-III Software Defined Networks

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	To understand the concepts of software defined network technology.
2.	To design and develop the best business solutions using software defined network.
3.	To manage the software defined network technology platforms and services.

	Course Contents	Hours
Unit 1	**History and evolution of SDN:** Definition, SDN Features, Cloud Benefits, Types, Economics; Historical Development:Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Cloud Computing Environments	**(8)**
Unit 2	**Control and data plane separation and SDN Control Plane:** Characteristics, Virtualization Techniques, Execution Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.	**(8)**
Unit 3	**Virtual networking:** Cloud Reference Model, Infrastructure as a Service, Platform as a Service Software as a Service. Green Cloud Computing Architecture, Security issues associated with the cloud, Challenges.	**(6)**
Unit 4	**Programmable Data Planes:** Amazon Web Services, Google AppEngine, Microsoft Azure, Force.com and Salesforce.com, Aneka	**(6)**
Unit 5	**Programming SDNs** An Architecture for Federated Cloud Computing; SLA Management in Cloud Computing: AService Provider's Perspective; When You Shouldn't Use Cloud Computing, Legal Issues in Cloud Computing.	**(6)**
Unit 6	**Verification and Troubleshooting** Scientific, Business and Consumer Applications, Cloud for e-Governance, Future Research Directions, Case Studies.	**(6)**

Text Books

1.	Software Defined Networks: A Comprehensive Approach Paperback – 2016 by Paul Goransson, Chuck Black, 2ndEdition,Elsevier Publication.
2.	Software Defined Networking (Sdn): Anatomy of Openflow Volume I - 2015by Doug Marschke, Jeff Doyle, Lulu Publishing.

Reference Books

1.	SDN: Software Defined Networks Paperback – 2013by Ken Gray (Author), 1st Edition, O'Reilly Media.
2.	Software Defined Networking with OpenFlowPaperback– Import, 31 Oct 2013by SiamakAzodolmolky (Author), 1st Edition, PACKT Publishing.

Useful Links

1.	http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7145320
2.	http://www.cisco.com/c/en_in/solutions/software-defined-networking/overview.html
3.	http://video.mit.edu/watch/tr10-software-defined-networking-541/
4.	https://ee.stanford.edu/research/software-defined-networking

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√	√		√		√	√	√	√	√
CO 2		√	√		√		√			√
CO 3	√		√	√	√	√	√	√	√	√

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	3	3	2	10
Understand	3	4	2	10
Apply	4	4	2	20
Analyse	3	-	2	-
Evaluate	2	3		20
Create	-	-	2	-
TOTAL	15	15	10	60

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1534 : Elective-III Applied Algorithms

Teaching Scheme			Examination Scheme	
Lectures	03 Hrs/week		CT – 1	15
			CT – 2	15
Total Credits	03		TA	10
			ESE	60
			Duration of ESE	02 Hrs 30 Min

Course Outcomes (CO)

1.	Student should aware of algorithms that have applications in areas like geometric modeling, graphics, robotics, vision, computer animation.
2.	Student should acquire problem formulation and problem solving skills.
3.	Be familiar with balance between programming and analytical problem solving..

	Course Contents	Hours
Unit 1	**Analysis of Algorithms** Review of algorithmic strategies, Asymptotic analysis: upper and lower complexity bounds. Identifying differences among best, average and worst Case Behaviors. Big O, little O, omega and theta notations, Standard complexity classes. Empirical measurements of performance. Time and space trade-offs in algorithms. Analyzing recursive algorithms using recurrence relations.	**(06)**
Unit 2	**Fundamental Computing Algorithms** Numerical algorithms, Sequential and binary search algorithms. Quadratic sorting algorithms and O (n log n) sorting algorithms. Algorithms on graphs and their complexities using Greedy Approach for --- Prim's and Krushkal's Algorithm for minimum spanning tree, Single source shortest path Algorithm, all pair shortest paths in Graph	**(08)**
Unit 3	**Approximation Algorithms** Introduction, Absolute approximation, Epsilon approximation, Polynomial time Approximation schemes, probabilistically good algorithms.	**(06)**
Unit 4	**Geometric Algorithms** Prerequisites – Basic properties of line, intersection of line, line segment, polygon etc. Line segment properties, detaining segment intersection in time complexity (n log n), Convex full problem – formulation, solving by Graham scan algorithm, Jarvis march algorithm; closest pair of points – problem formulation, solving by divide & conquer method.	**(08)**
Unit 5	**Linear Programming** Standard and Slack forms, formulation of problems as linear programs, simplex algorithm, duality, initial basic feasible solution. Problem formulation for – single source shortest path, maximum flow problem, Vertex cover problem, Knapsack problem	**(06)**
Unit 6	**Probability Based Analysis** Expectations: Introduction, Moments, Expectations of functions of more than one random variable, transform methods, moments and transforms of distributions, computation of mean time to failure, inequalities and limit theorems.	**(06)**

Text Books

1.	"Introduction to Algorithms (3rd Edition), Cormen, Leiserson, Rivest, and Stein MIT press, 2009:
2.	"The Design and Analysis of Computer Algorithms", Aho, Hopcraft, Ullman, Addison Wesley

Reference Books

1.	"Probability & Statistics with Reliability, Queing, and Computer Science Applications", Kishore S. Trivedi, PHI
2.	"Fundamentals of Algorithms", Bressard, PHI
3.	"Algorithms", Cormen, Leiserson, Rivest, PHI
4.	"Art of Programming", Knuth, Addison Wesley
5.	"Computer Algorithms: Introduction to Design and Analysis", S. Baase, S and A. Van Gelder, 3rd edition. Addison Wesley,2000
6.	"Combinatorial Optimization", C Papadimitriou and K Steiglitz, PHI

Useful Links

1.	https://nptel.ac.in/courses/106106131 Prof. Madhavan Mukund, Channai Mathematical Institute
2.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-854j-advanced-algorithms

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1			√	√	√	√		√	√	√
CO 2		√	√		√		√		√	
CO 3	√	√		√	√	√	√	√		√

Assessment Pattern (with revised Bloom's Taxonomy)

Knowledge Level	CT 1	CT 2	TA	ESE
Remember	5	5	-	10
Understand	5	5	2	10
Apply	5	5	3	20
Analyse	-	-	-	-
Evaluate	-	-	2	20
Create	-	-	3	-
TOTAL	15	15	10	60

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Third Year (Sem – V) M. C. A.

MC1505: Internet of Things Lab

Teaching Scheme			Examination Scheme	
Practical	02 Hrs/week		CA	50
Tutorial	02 Hrs/week			
Total Credits	03			

Course Outcomes (CO)

1.	Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack.
2.	Design a simple IoT system comprising sensors, edge devices, wireless network connections and data analytics capabilities.
3.	Use the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis.
4.	Students will be able to develop android applications for mobile devices.

	Course Contents	Hours
Unit 1	**Introduction to the Internet of Things:** What is the IoT and why is it important? Elements of an IoT ecosystem. Technology drivers, Business drivers, Typical IoT applications, Trends and implications	**(08)**
Unit 2	**IOT Hardware and Software** Sensing devices, Sensor modules, nodes and systems	**(08)**
Unit 3	**IOT technologies and protocols** NFC and RFID, Protocols- ZigBee, Z-Wave,	**(08)**
Unit 4	**Analytics and applications:** Signal processing, real-time and local analytics, Databases, cloud analytics and applications.	**(04)**
Unit 5	**Implementation of IOT** Introduction to Arduino Programming, Implementation of IoT with Raspberry Pi4	**(04)**
Unit 6	**Android Activity and GUI Design Concepts** Overview of Android, What does Android run On – Android Internals? Android for mobile apps development, Environment setup for Android apps Development, Framework – Android SDK, Eclipse, Emulators. Design criteria for Android Application : Hardware Design Consideration, Design Demands For Android application, Intent, Activity, Activity Lifecycle and Manifest, Creating Application and new Activities, Simple UI -Layouts and Layout properties :Introduction to Android UI Design, Introducing Layouts, XML Introduction to GUI objects viz.: Push Button , Text / Labels , EditText, ToggleButton , Padding	**(08)**
Tutorials		
	A set of Tutorial/ problems based on above syllabus is to be submitted	

Sample List of Experiments:

Experiment 1	Connect R PI to input output devices.	
Experiment 2	Installation of Raspbian on R Pi SD Card.	
Experiment 3	Interfacing LED on Raspberry GPIO and use timer.	
Experiment 4	Study and Install IDE of Arduino and different Types of Arduino	
Experiment 5	Interfacing IR sensor on Raspberry GPIO.	
Experiment 6	Interfacing Relay circuit on R pi.	
Experiment 7	Introduction to Android Operating System	
Experiment 8	Develop an Android application for building user login interface	
Experiment 9	Develop an Android application for use of internet resources, use of graphical images.	
Experiment 10	Develop an Android application with the help of table, frame, calendar, camera, etc.	
Experiment 11	Identify the real time problem and develop Android application	
List of Submission:		
	Total number of Experiments: 10	

Text Books

1.	J. Biron and J. Follett, "Foundational Elements of an IoTSolution", 1st edition, O'Reilly Media,2016
2.	CunoPfister, Getting Started with the Internet of Things, 1st edition O'RELLY Media,2011

Reference Books			
1.	Charles Bell, "Beginning Sensor Networks with Arduino and RaspberryPi",1st edition,A press, 2013.		
2.	Eben Upton, The Raspberry Pi User Guide, 2nd edition,Wiley,2013		
Useful Links			
1.	https://www.youtube.com/watch?v=9ZUFYyXhQm8, Introduction to Internet of Things, KnoesisCenter		
2.	Introduction to Internet of Things: Course homepage: http://www.knoesis.org/cs4800-6800-sp...Dr.Alexandru		

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√	√						√		√
CO 2				√	√	√				
CO 3			√				√		√	√
CO 4		√	√	√	√			√		

Assessment Pattern(with revised Bloom's Taxonomy)

Skill Level (as perCAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Project 1	Project 2	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	05	05	
CA													

Government College of Engineering, Karad				
Third Year (Sem – V) M. C. A.				
MC1506: Data Science Lab				
Teaching Scheme			**Examination Scheme**	
Practical	02 Hrs/week		CA	50
Total Credits	01			

Course Outcomes (CO)

1.	Understanding of Data Science for and the skillset needed to be a Data Scientist
2.	Understanding different tools for Data Science.
3.	To Apply basic machine learning algorithms (Linear Regression, k-Nearest Neighbors (k-NN), k-means, Naive Bayes) for predictive modeling.
4	To Create effective visualization of given data (to communicate or persuade).

	Course Contents	
Experiment 1	Data Science Overview	
Experiment 2	Statistical Analysis and Business Applications	
Experiment 3	Python/R Environment Setup and Essentials	
Experiment 4	Mathematical Computing with Python/R	
Experiment 5	Scientific computing with Python/R	
Experiment 6	Data Manipulation with Pandas/R	
Experiment 7	Machine Learning with Scikit–Learn/CARET	
Experiment 8	Natural Language Processing with Scikit-Learn/EDA	
Experiment 9	Data Visualization in Python/R	
Experiment 10	Web Scraping with Python/R	
Experiment 11	Python/R integration with Hadoop MapReduce and Spark	
List of Submission:		
	Minimum 10 experiments to be performed and evaluated Journal	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√	√						√		√
CO 2		√			√	√				
CO 3			√	√			√		√	√
CO 4	√					√		√		√

Assessment Pattern(with revised Bloom's Taxonomy)

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp9	Exp10	CA
Assembling		√	√	√		√					√
Testing			√					√			
Observing	√	√	√	√	√	√	√	√	√	√	
Analyzing	√	√	√		√	√	√	√	√	√	
Interpreting	√	√	√	√		√	√				
Designing	√	√		√	√	√	√	√	√	√	
Creating		√		√	√	√	√	√	√	√	
Deducing conclusions	√		√		√	√	√	√	√	√	

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Second Year (Sem – V) M. C. A.

MC 1507 : Scripting Language Lab

Teaching Scheme			Examination Scheme	
Practical	04 Hrs/week		CA	50
Tutorials	02 Hrs/week		ESE	50
Total Credits	04			

Course Outcomes (CO)

1.	Implement client side scripting languages such as JavaScript and JQuery.
2.	Implement server side scripting language such as Php.
3.	Implement I/O operations using Python.

	Course Contents	Hours
Unit 1	**Introduction to Scripting Languages:** Scripting Languages, Similarities and difference between Scripting Languages and Programming Languages, Advantages and Disadvantages of Scripting Langiages, Use of Scripting Languages.	**(04)**
Unit 2	**JavaScript:** Introduction to JavaScript, Variables, Arrays, Loops, Conditional Statements, Functions, Cookies, DOM, Events, Object Oriented JavaScript, Internal & External JavaScript.	**(06)**
Unit 3	**JQuery:** Introduction, Data Types, Objects, Arrays, Functions, Arguments, Scope, Built-in Functions, Selectors, use of Selectors, DOM Attributes, DOM Traversing, CSS Methods, DOM Manipulation Methods, Effects	**(06)**
Unit 4	**AJAX:** Ajax Basics, Ajax Components, DOM, Passing Data, Server Side Code, API, Ajax Applications, Ajax/Javascript Frameworks, Ajax Applications.	**(06)**
Unit 5	**PHP:** PHP Basic syntax, PHP data Types, PHP Variables, PHP Constants, PHP Expressions, PHP Operators, PHP Control Structures, PHP Loops, PHP Enumerated Arrays, PHP Associative Arrays, Array Iteration, PHP Multi-Dimensional Arrays, Array Functions, PHP Functions, Syntax, Arguments, Variables, References, Pass by Value & Pass by references, Return Values, Variable Scope, PHP include(), PHP require(), PHP Form handling, PHP GET, PHP POST, PHP Form Validation, PHP Form Sanitization, PHP Cookie handling, PHP Session Handling, PHP Login Session, Managing user ACL, Strings and Patterns, Matching, Extracting, Searching Replacing, Formatting.	**(10)**
Unit 6	**Python:** Variable and Data Types, Operator, Conditional Statements, Looping, Control Statements, String Manipulation, Lists, Tuple, Dictionaries, Functions, Modules, Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Exception Handling	**(08)**

Tutorials

A set of Tutorial/ problems based on above syllabus is to be submitted

Sample List of Experiments:

Experiment 1	Introduction to Various Scripting Langauges.	
Experiment 2	Progam to a JavaScript program to display information box as soon as page loads.	
Experiment 3	Create a form, put validation checks on values entered by the user using JavaScript (such as age should be a value between 1 and 150, Mandatory fields, Input Numbers only).	
Experiment 4	Highlight table row record on hover with jQuery.	
Experiment 5	Event Handling using Jquery.	
Experiment 6	To create a text box and submit button of event handling submit form () using AJAX.	
Experiment 7	Develop a dynamic webpage demonstrating the use of AJAX and APIs.	
Experiment 8	Program to PHP Enumerated Arrays, PHP Associative Arrays, Array Iteration, PHP Multi-Dimensional Arrays, Array Functions.	
Experiment 9	String Handling in PHP.	

Experiment 10	Program to PHP Form handling, PHP GET, PHP POST, PHP Form Validation, PHP Form Sanitization.	
Experiment 11	Develop a program demonstrating the use of Variables, strings, and Numbers in Python	
Experiment 12	Use Python to demonstrate Input-Output, Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files.	
List of Submission:		
	Minimum 10 experiments to be performed and evaluated Journal.	

Text Books	
1.	Web Design with HTML, CSS, JavaScript and jQuery Set by Jon Duckett
2.	Head First PHP and MySQL by Lynn Beighley and Michael Morrison
3.	Python Crash Course by Eric Matthews
Reference Books	
1.	HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) 2Ed. By DT Editorial Services
2.	The Joy of PHP: A Beginner's Guide by Alan Forbes
3.	Head-First Python by Paul Barry
Useful Links	
1.	https://nptel.ac.in/courses/106105084/25
2.	https://nptel.ac.in/courses/106105084/13
3.	https://nptel.ac.in/courses/117106113/34

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√	√	√	√	√	√	√	√	√	√
CO 2							√		√	√
CO 3		√	√	√	√	√			√	

Assessment Pattern(with revised Bloom's Taxonomy)

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp9	Exp10	CA
Assembling		√	√	√		√					√
Testing			√					√			
Observing	√	√	√	√	√	√	√	√	√	√	
Analyzing	√	√	√		√	√	√	√	√	√	
Interpreting	√	√	√	√		√	√				
Designing	√	√		√	√	√	√	√	√	√	
Creating		√		√	√	√	√	√	√	√	
Deducing conclusions	√		√		√	√	√	√	√	√	

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Third Year (Sem – V) M. C. A.

MC1508: Software Development Project Lab

Teaching Scheme			Examination Scheme	
Practical	04 Hrs/week		CA	100
Tutorial	02 Hrs/week		ESE	50
Total Credits	04			

Course Outcomes (CO)

1.	Students will demonstrate knowledge of the distinction between critical and noncritical systems.
2.	Students will demonstrate the ability to manage a project including planning, scheduling and risk assessment/management.
3.	Students will demonstrate proficiency in rapid software development techniques.
4	Students will be able to identify specific components of a software design that can be targeted for reuse.

Nature of Project

	The project batches of 2-3 students should be formed, which will work on the project allocated by the department. The batch must complete it during first semester only. Term work submission should be done in the form of a joint report. The term work assessment will be done jointly by teachers appointed by Head of the Institution. The oral examination will be conducted by an internal and external examiner as appointed by the University.	
1	Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.	
2	Two mid-term evaluations should be done, which includes presentations and demos of the work done.	
Project Report Format:	Project report should be of 15 to 20 pages (typed on A4 size sheets). For standardization of the project reports the following format should be strictly followed.	
	1. Page Size: Trimmed A4 **2. Top Margin:** 1.00 Inch **3. Bottom Margin:** 1.32 Inches **4. Left Margin:** 1.5 Inches **5. Right Margin:** 1.0 Inch **6. Para Text:** Times New Roman 12 Point Font **7. Line Spacing:** 1.5 Lines **8. Page Numbers:** Right Aligned at Footer. Font 12 Point. Times New Roman **9. Headings:** Times New Roman, 14 Point Bold Face **10. Certificate:** All students should attach standard format of Certificate as described by the department. Certificate should be awarded to batch and not to individual student. Certificate should have signatures of Guide, Head of Department and Principal/ Director. **11. Index of Report:** **a.** Title Sheet **b.** Certificate **c.** Acknowledgement **d.** Table of Contents **e.** List of Figures **f.** List of Tables **12. References:** References should have the following format For Books: "Title of Book", Authors, Publisher, Edition For Papers: "Title of Paper", Authors, Journal/Conference Details, Year	
Useful Links:		
1	http://www.geeksforgeeks.org/	
2	https://in.udacity.com/	
3	https://graphics.stanford.edu/~seander/bithacks.html	
4	https://www.youtube.com/results?search_query=mycodeschool	
5	https://www.hackerrank.com/	

Tutorials:		
	Eight tutorials based on project is to be submitted.	

Mapping of COs and POs

PO → CO ↓	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CO 1	√	√		√	√	√		√	√	√
CO 2	√	√	√	√	√	√	√		√	√
CO 3			√			√				
CO 4	√	√		√	√		√	√	√	√

Assessment Pattern(with revised Bloom's Taxonomy)

Skill Level	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp9	Exp10	Project I	Project II	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	15	
Task II	05	05	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	05	05	
CA													

Government College of Engineering, Karad

Third Year (Sem – V) M. C. A.

MC1601: Industrial Project

Teaching Scheme			Examination Scheme	
Contact Hours	30 Hrs/week		CA	100
			ESE	100
Total Credits	15			

Course Outcomes (CO)

1.	Students will demonstrate knowledge of the distinction between critical and noncritical systems.
2.	Students will demonstrate the ability to manage a project including planning, scheduling and risk assessment/management.
3.	Students will demonstrate proficiency in rapid software development techniques.
4	Students will be able to identify specific components of a software design that can be targeted for reuse.

Nature of Project

	The project work to be carried out individually commences in the Semester VI as per the project assigned to the each individual by the respective industry.It shall include the problem definition, literature survey, approaches for handling the problem, finalizing the methodology for the project work and system design etc. Term work submission should be done in the form of anindividual report. The term work assessment will be done jointly by teachers appointed by Head of the Department. The oral examination will be conducted by an internal and external examiner as appointed by the Institute.	
1	Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.	
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Mapping of COs and POs

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CO 2	√	√	√	√	√	√	√		√	√
CO 3			√			√				
CO 4	√	√		√	√		√	√	√	√

Assessment Pattern(with revised Bloom's Taxonomy)

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Task II	05	05	05	05	05	05	05	05	05	05	05	05	
Task III	05	05	05	05	05	05	05	05	05	05	05	05	
CA													