Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Scheme of Instruction for First Year of M. Tech. (PG) Degree in Computer Science and Engineering

Semester – I (W.E.F. AY. 2019-20)

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs./Wk	Credits	EXAM SCHEME				
									CT1	CT2	TA / CA	ESE	TOTAL
1	PCC	CS101	Mathematical foundations of Computer Science	3	-	-	3	3	15	15	10	60	100
2	PCC	CS102	Advanced Data Structures and Algorithms	3	-	-	3	3	15	15	10	60	100
3	PEC	CS1*3	Program Elective I	3	-	-	3	3	15	15	10	60	100
4	PEC	CS1*4	Program Elective II	3	-	-	3	3	15	15	10	60	100
5	MDC	CS105	Research Methodology	2	-	-	2	2	15	15	10	60	100
6	PCC	CS106	Laboratory 1(Advanced Data Structures and Algorithms)	-	-	4	4	2	-	-	25	25	50
7	PEC	CS107	Laboratory 2 (Based on Elective I & II)	-	-	4	4	2	-	-	50	-	50
8	OEC	ÒE1*8	Open Elective	3	-	-	3	3	15	15	10	60	100
9	MNC	AU1*9	Audit Course I	2	-	-	2	Audit	-	-	-	-	-
			Total	19	-	8	27	21	90	90	135	385	700

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)

*- Program Elective- I and II, Audit Course I, Open Elective list is provided at the end of structure.

Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Scheme of Instruction for First Year of M. Tech. (PG) Degree in Computer Science and Engineering

Semester – II (W.E.F. AY. 2019-20)

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Credits	EXAM SCHEME				
									CT1	CT2	TA / CA	ESE	TOTAL
1	PCC	CS201	Advanced Computer Networks	3	-	-	3	3	15	15	10	60	100
2	PCC	CS202	Soft Computing	3	-	-	3	3	15	15	10	60	100
3	PEC	CS2*3	Program Elective III	3	-	-	3	3	15	15	10	60	100
4	PEC	CS2*4	Program Elective IV	3	-	-	3	3	15	15	10	60	100
5	PEC	CS2*5	Program Elective V	3	-	-	3	3	15	15	10	60	100
6	PCC	CS206	Laboratory 3 (Based on cores)	-	-	4	4	2	-	-	25	25	50
7	PCC	CS207	Laboratory 4 (Based on Elective III & IV)	-	-	4	4	2	-	-	50	-	50
8	P/S/IT	CS208	Seminar	-	-	4	4	2	-	-	100	-	100
9	MNC	AU2*9	Audit Course II	2	-	-	2	Audit	-	-	-	-	-
			Total	17	-	12	29	21	75	75	225	325	700

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)

*- Program Elective- III, IV and V, Audit Course II list is provided at the end of structure.

Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Scheme of Instruction for Second Year of M. Tech. (PG) Degree in Computer Science and Engineering

Semester – III (W.E.F. AY. 2020-21)

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Credits	EXAM SCHEME				
									CT1	CT2	TA/CA	ESE	TOTAL
1	P/S/IT	CS301	Dissertation Phase-I	-	-	14	14	07	-	-	100	100	200
2	MOOC	CS302	MOOCs / OPEN COURSE (8-12 weeks)	-	-	-	-	03	-	-	-	-	-
			Total	00	00	14	14	10	-	-	100	100	200

Note:

1. CS302 will be decided by respective Guide in Consultation with Program Coordinator. Course is mandatory for student and candidate dissertation phase I will be considered incomplete without this Mandatory MOOC Course.
2. In Case, the course offered online are not completely relevant with the topic of dissertation then any course suggested by NASSCOM on recent technologies can be opted by candidate.

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

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

Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Scheme of Instruction for Second Year of M. Tech. (PG) Degree in Computer Science and Engineering

Semester – IV (W.E.F. AY. 2020-21)

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Contact Hrs/Wk	Credits	EXAM SCHEME				
									CT1	CT2	TA/CA	ESE	TOTAL
1	P/S/IT	CS401	Dissertation phase-II	-	-	32	32	16	-	-	100	200	300
			Total	-	-	32	32	16	-	-	100	200	300

CT1- Class Test 1 TA/CA- Teacher Assessment/Continuous Assessment
CT2- Class Test 2 ESE- End Semester Examination (For Laboratory: End Semester Perform

Government College of Engineering, Karad

SCHEME OF INSTRUCTION & SYLLABI

Scheme of Instruction for First Year of M. Tech. (PG) Degree in Computer Science and Engineering

List of Electives

Program Elective I	Program Elective II	Program Elective III	Program Elective IV	Program Elective V
Semester - I	**Semester - I**	**Semester - II**	**Semester - II**	**Semester – II**
CS113: Machine Learning	**CS114:** Data Science	**CS213:** Data Preparation and Analysis	**CS214:** Human and Computer Interaction	**CS215:** Mobile Technologies and Services
CS123 Wireless Sensor Networks	**CS124:** Advanced Distributed Systems	**CS223:** Secure Software Design & Enterprise Computing	**CS224:** GPU Computing	**CS225:** Compiler for HPC
CS133 Introduction to Intelligent Systems	**CS134:** Advanced Mobile Computing	**CS233:** Computer Vision	**CS234:** Digital Forensics	**CS235:** Optimization Techniques

Audit Course I	Audit Course II	Open Elective
Semester – I	**Semester – II**	**Semester - I**
AU119: Research Paper Writing	**AU219:** Constitution of India	**OE118:** Business Analytics
AU129: Disaster Management	**AU229:** Pedagogy Studies	**OE128:** Industrial Safety
AU139: Sanskrit for Technical Knowledge	**AU239:** Stress Management by Yoga	**OE138:** Operations Research
AU149: Value Education	**AU249:** Personality Development through Life Enlightenment Skills	**OE148:** Cost Management of Engineering Projects
		OE158: Composite Materials
		OE168: Waste to Energy

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

CS101: Mathematical Foundations of Computer Science

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand the basic notions of discrete and continuous probability.

2 Understand the methods of statistical inference.

3 Perform correct and meaningful statistical analyses of simple to moderate complexity.

Course Contents

		Hours
Unit 1	**Random Variables:** Discrete random variables: Random variables and their event spaces, Analysis of program MAX, Discrete random vectors, Independent random variables Continuous random variables: The exponential distribution, Reliability and failure rate, Functions of a random variables, Order statistics, Distribution of sums	(07)
Unit 2	**Probability**: Probability mass, Density, and cumulative distribution functions, Parametric families of distributions, Expected value, variance, conditional expectation, Applications of the univariate and multivariate Central Limit Theorem, Probabilistic inequalities.	(07)
Unit 3	**Markov Chains:** Discrete-Time Markov Chains: Introduction, Computation of n-step transition probabilities, State classification and limiting probabilities, Distribution of time between state changes, Markov modulated Bernoulli process, Irreducible finite chains with aperiodic states, The M/G/1 queuing system, Discrete time birth-death processes Continuous-Time Markov Chains: The birth- death process, Non-birth-death process, Markov chains with absorbing states.	(11)
Unit 4	**Stochastic Processes:** Introduction, Classification of stochastic processes, The Bernoulli process, The poison process, Renewal process, Availability analysis, Random analysis.	(08)
Unit 5	**Regression and Analysis of Variance:** Introduction, Least-squares curve fitting, The coefficients of determination, Confidence intervals in linear regression, Trend detection and slope estimation, Correlation analysis, Analysis of variance.	(10)
Unit 6	**Statistical Inference**: Introduction, Parameter estimation, Hypothesis testing.	(05)

Text Books:

1 John Vince, "Foundation Mathematics for Computer Science", Springer Cham, 2015.
2 K. Trivedi, "Probability and Statistics with Reliability, Queuing, and Computer Science Applications", Wiley Publication.

References:

1 M. Mitzenmacher, E. Upfal, "Probability and Computing: Randomized Algorithms and Probabilistic Analysis", Cambridge University Press; 2nd edition, 2017.
2 Alan Tucker, "Applied Combinatorics", Wiley, Wiley; 6th edition, 2016.
3 T.Veerarajan, "Probability, Statistics and Random Process", Tata Mc-Graw Hill Co., 3rd Edition, 2016.
4 Norman L.Biggs, "Discrete Mathematics", 2nd edition, Oxford University Press, 2017.

Useful Links:

1 https://nptel.ac.in/courses/111106102/ Prof. Soumen Maity, IISER, Pune.
2 https://nptel.ac.in/courses/122104017/ Prof. S. K. Ray, IIT, Kanpur.

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	1	-	-	-	-	-	-	-	-	1
CO3	2	1	1	-	-	-	-	-	-	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	20
Understand			3	20
Apply			3	
Analyze	5	5	1	10
Evaluate	5	5		5
Create				5
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

CS102: Advanced Data Structures and Algorithms

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1. Develop algorithms for text processing applications.
2. Identify suitable data structures and develop algorithms for computational geometry problems
3. Determine the appropriate data structure for solving a particular set of problems
4. Categorize the different problems in various classes according to their complexity.

Course Contents

		Hours
Unit 1	**Skip Lists:** Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists**,**	(05)
Unit 2	**Text Processing:** Sting Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.	(10)
Unit 3	**Computational Geometry:** One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad trees, k-D Trees.	(08)
Unit 4	**Matroids**: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST. Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.	(08)
Unit 5	**Flow-Networks:** Max flow-min cut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm. Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.	(08)
Unit 6	**Linear Programming:** Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness, Approximation algorithms, Randomized Algorithms	(08)

Text Books:

1 Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 2nd Edition, Pearson, 2004.

2 M T Goodrich, Roberto Tamassia, "Algorithm Design", John Wiley, 2002.

3 Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms", MIT Press Ltd, 3rd edition.

4 Aho, Hopcroft, Ullman, "The Design and Analysis of Computer Algorithms", Pearson education, 2009.

References:

1 Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, "Data Structures Using C and C++", Pearson Publication, 2006.

2 E. Horowitz, S. Sahani, S.Anderson Freed, "Fundamentals of Data Structures in C", SP Publication, 2nd Edition.

3 Thomas H. Cormen, Leiserson .C.E, Rivest.R.L, Stein.C, "Introduction to Algorithm", 2nd edition (2001), MIT press, USA.

4 Kleinberg, Tardos,"Algorithm Design", Pearson education.

5 S. Sridhar, "Design and Analysis of Algorithms", Oxford, 2014.

Useful Links:

1 https://nptel.ac.in/courses/106103069/ IIT Guwahati.

2 https://nptel.ac.in/courses/106104019/ IIT, Kanpur

3 https://nptel.ac.in/courses/106101060/ IIT, Bombay

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	3	-	1	-	-	-	-	1	-	1	-
CO2	-	3	-	1	-	-	-	-	1	-	1	-
CO3	-	3	-	1	-	-	-	-	1	-	1	1
CO4	-	3	-	1	-	-	-	-	1	-	1	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember				10
Understand	5	5	3	20
Apply		5	3	10
Analyze	5	5	3	10
Evaluate	5		1	10
Create				
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-I) M. Tech. Computer Science & Engineering
CS105: Research Methodology

Teaching Scheme		**Examination Scheme**	
Lectures	2Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**2**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand research problem formulation.
2 Analyze research related information.
3 Understand the research ethics.
4 Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5 Understanding that when IPR would take such important place in growth of individuals &nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6 Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Course Contents

		Hours
Unit 1	**Meaning of research problem:** Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations	(06)
Unit 2	**Effective literature studies approaches:** analysis, Plagiarism, Research ethics	(03)
Unit 3	**Effective technical writing:** how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee	(04)
Unit 4	**Nature of Intellectual Property:** Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT	(06)
Unit 5	**Patent Rights:** Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.	(04)
Unit 6	**New Developments in IPR:** Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs	(03)

Text Books:

1 C. R. Kothari, "Research methodology", New Age International Publisher, 2nd Edition.
2 Stuart Melville, Wayne Goddard, "Research methodology: An introduction for science & engineering students", Juta Academic; 2nd edition, 2001
3 Wayne Goddard, Stuart Melville, "Research Methodology: An Introduction", Juta Academic; 2nd edition, 2001

References:

1 Ranjit Kumar, "Research Methodology: A Step by Step Guide for beginners", 2nd Edition.
2 Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd, 2007.
3 Mayall, "Industrial Design", McGraw Hill, 1992.
4 Niebel, "Product Design", McGraw Hill, 1974.
5 Asimov, "Introduction to Design", Prentice Hall, 1962.
6 Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
7 T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008.
8 Prabuddha Ganguli, "Intellectual Property Rights: Unleashing the Knowledge Economy", Tata McGraw-Hill Publishing Company, ISBN: 0074638602, 9780074638606, 2001.
9 Kalyan C. Kankanala,"Indian Patent Law", Oxford University Press, ISBN: 9780198089605, 0198089600, 2012.
10 Kalyan C. Kankanala,"Fundamentals of Intellectual Property", Asia Law House, ISBN: 9789381849514, 938184951X, 1st Edition, 2012.

Useful Links:

1 https://nptel.ac.in/courses/121106007/ IIT Madras
2 https://nptel.ac.in/courses/107108011/ IISc Banglore

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	1	-	3	-	3	-	1	-	3	3
CO2	-	-	1	-	3	-	3	-	1	-	3	3
CO3	-	-	1	-	3	-	3	-	1	-	3	3
CO4	-	-	1	-	3	-	3	-	1	-	3	3
CO5	-	-	1	-	3	-	3	-	1	-	3	3
CO6	-	-	1	-	3	-	3	-	1	-	3	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember				10
Understand	5	5	3	20
Apply	5	5	3	10
Analyze	5	5	3	20
Evaluate				
Create			1	
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-I) M. Tech. Computer Science & Engineering
CS106: Laboratory 1(Advanced Data Structures and Algorithms)

Laboratory Scheme		**Examination Scheme**	
Practical	4 Hrs/week	**CA**	**25**
Total Credits	**2**	**ESE**	**25**

Course Outcome(CO): After completion of course, students would be able to:

1 Choose appropriate data structure as applied to specified problem definition.

2 Apply knowledge of algorithms in real world application.

Course Contents

Experiment 1 Implementation of search and update operation on skip lists.
Experiment 2 Implementation of Boyer-Moore Algorithm.
Experiment 3 Implementation of Brute-Force string Pattern Matching algorithm.
Experiment 4 Implementation of The Knuth-Morris-Pratt Algorithm.
Experiment 5 Write a program to Construct a Priority Search Tree.
Experiment 6 Implementation of k-D Trees.
Experiment 7 Write a program to implement find Adjacency matrix for a given graph.
Experiment 8 Write a program to implement find minimum cost of spanning tree using Prims Algorithm.
Experiment 9 Write a program to solve Eight Queens problem using Back Tracking Technique.
Experiment 10 Write a program to implement Edmond's Blossom algorithm to compute augmenting path.
Experiment 11 Write a program to implement Strassen's algorithm.
Experiment 12 Write a program to implement Ford-Fulkerson method to compute maximum flow.

List of Submission:

1. Total number of Experiments: 10

Mapping of COs and POs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	2	1	1	1	1	1	-	1	-	2	1
CO2	-	2	-	2	1	1	1	-	1	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	
Task II	5	5	5	5	5	5	5	5	5	5	5	
Task III	5	5	5	5	5	5	5	5	5	5	5	
CA												

Government College of Engineering, Karad
First Year (Sem-I) M. Tech. Computer Science & Engineering
CS107: Laboratory 2 (Based on Elective I & II)

Laboratory Scheme		**Examination Scheme**	
Practical	4 Hrs/week	**CA**	**50**
Total Credits	**2**	**ESE**	**--**

Course Outcome(CO): After completion of course, students would be able to:

1. Implement various artificial neural network algorithms.
2. Explain the basics of network protocol and simulation tools.
3. Explain the concepts of fuzzy logic.
4. Demonstrate various data analysis and visualisation tools.
5. Implement RPC, RMI and EJB in distributed systems.
6. Implement protocols of Wireless and Mobile Networks

Course Contents

Group A - Machine Learning

Experiment 1 Write a program to demonstrate the working of the **decision tree based ID3 Algorithm**. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

Experiment 2 Build an **Artificial Neural Network** by implementing the Back propagation algorithm and test the same using appropriate data sets.

Experiment 3 Write a program to implement the **naïve Bayesian classifier** for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

Experiment 4 Assuming a set of documents that need to be classified, use the **naïve Bayesian Classifier** model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

Experiment 5 Write a program to construct a **Bayesian network** considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

Experiment 6 Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using **k-Means algorithm**. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

Group B - Wireless Sensor Networks

Experiment 7 Study about NS2 or any other simulator in detail.

Experiment 8 Create scenario and study the performance of token bus protocol through simulation.

Experiment 9 Create scenario and study the performance of token ring protocols through simulation.

Experiment 10 Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.

Experiment 11 Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination

Experiment 12 Implement and study the performance of CDMA on NS2/NS3/ any other simulators (Using stack called Call net) or equivalent environment.

Group C - Introduction to Intelligent Systems

Experiment 13 Develop an artificial neural network using Python.

Experiment 14 Write a program for Fuzzy Logic using Python.

Experiment 15 Write a Python program to solve 8 queens problem

Experiment 16 Write a Python program to solve any problem using depth first search.

Experiment 17 Write a Python program to solve any problem using best first search.

Experiment 18 Write a Python program to solve traveling salesman problem.

Group D - Data Science

Experiment 19 Create a calculator application using R.

Experiment 20 Reading and writing different types of datasets
a. Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location.
b. Reading Excel data sheet in R.
c. Reading XML dataset in R.

Experiment 21 Visualizations using R
a. Find the data distributions using box and scatter plot.
b. Find the outliers using plot.
c. Plot the histogram, bar chart and pie chart on sample data

Experiment 22 Data processing
Create an application for data processing using Python, Pandas and Numpy.

Experiment 23 Data Visualization
Create an application for data visualization using Python, Pandas and Numpy.

Experiment 24 Create an application for analysing data using Python.

Group E - Distributed Systems

Experiment 25 Implementation of multi-threaded client/server processes.

Experiment 26 Write a program to demonstrate process/code migration.

Experiment 27 Implementation of a distributed application using EJB

Experiment 28 Create CORBA based server-client application

Experiment 29 Implementation of an Election algorithm.

Experiment 30 Implementation of Banker's Algorithm for avoiding Deadlock

Group F – Advanced Mobile Computing

Experiment 31 Implementation of distance vector routing algorithm

Experiment 32 Implementation of Link state routing algorithm

Experiment 33 Study of Socket Programming and Client – Server model

Experiment 34 Implementation of Error Detection / Error Correction Techniques

Experiment 35 Implementation of Stop and Wait Protocol and sliding window

Experiment 36 Implementation and study of Goback-N and selective repeat protocols

List of Submission:

1. Total number of Experiments :
   Solve any two group experiments of respective elective subjects.

Mapping of COs and POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	2	1	1	1	-	-	-	-	-	2	1
CO2	-	1	-	1	1	-	-	-	-	-	2	1
CO3	-	1	1	2	-	-	-	-	-	-	2	1
CO4	-	1		2	1	-	-	-	-	-	2	1
CO5	-	1	1	2	1	-	-	-	-	-	2	1
CO6	-	2	1	1		-	-	-	-	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 11	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	
Task II	5	5	5	5	5	5	5	5	5	5	5	
Task III	5	5	5	5	5	5	5	5	5	5	5	
CA												

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

CS113: Program Elective-I: Machine Learning

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Explain features that can be used for a particular machine learning approach in various IOT applications.
2 Compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
3 Analyse various machine learning approaches and paradigms.

Course Contents

		Hours
Unit 1	**Supervised Learning (Regression/Classification):** Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes, Linear models: Linear Regression, Logistic Regression, Generalized, Linear Models, Support Vector Machines, Nonlinearity and Kernel Methods, Beyond Binary Classification: Multi-class/Structured Outputs, Ranking	(10)
Unit 2	**Unsupervised Learning:** Clustering: K-means/Kernel K-means, Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion, Generative Models (mixture models and latent factor models)	(06)
Unit 3	**Evaluating Machine:** Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random forests)	(07)
Unit 4	**Sparse Modelling and Estimation:** Modelling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning	(09)
Unit 5	**Scalable Machine Learning (Online and Distributed Learning):** A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference	(09)
Unit 6	**Recent trends** in various learning techniques of machine learning and classification methods for IOT applications. Various models for IOT applications	(05)

Text Books:

1 Kevin Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.
2 Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Springer 2009 (freely available online).

3 Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer, 2007.

References:

1 Ethem Alpaydin, “Introduction to Machine Learning”, MIT Press, 2nd Edition.
2 Andreas Muller, “Introduction to Machine Learning with Python: A Guide for Data Scientists”, O’Reilly, 2006.
3 Tom M. Mitchell. "Machine Learning" McGraw-Hill, 1997.
4 P. Langley. "Elements of Machine Learning" Morgan Kaufmann Publishers, Inc. 1996.

Useful Links:

1 https://nptel.ac.in/courses/106105152/ IIT Kharagpur

2 https://nptel.ac.in/courses/106106139/ IIT Madras

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	1	1	-	-	-	-	-	-	2	1
CO2	-	1	-	-	-	-	-	-	-	-	1	2
CO3	-	1	1	-	-	-	-	-	-	-	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember			3	10
Understand	5	5	3	20
Apply	5	5	3	10
Analyze				
Evaluate	5	5	1	20
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

CS123: Program Elective-I: Wireless Sensor Networks

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Describe and explain radio standards and communication protocols for wireless sensor networks.
2 Explain the function of the node architecture and use of sensors for various applications.
3 Be familiar with architectures, functions and performance of wireless sensor networks systems and platforms.

Course Contents

		Hours
Unit 1	**Introduction to Wireless Sensor Networks:** Course Information, Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors Network Architecture: Traditional layered stack, Cross-layer designs, Sensor Network Architecture Hardware Platforms: Motes, Hardware parameters	(09)
Unit 2	**Introduction to NS-3: I**ntroduction to Network Simulator 3 (ns-3), Description of the ns-3 core module and simulation example	(09)
Unit 3	**Medium Access Control Protocol design:** Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled Introduction to Markov Chain: Discrete time Markov Chain definition, properties, classification and analysis MAC Protocol Analysis: Asynchronous duty-cycled. X-MAC Analysis (Markov Chain)	(09)
Unit 4	**Security**: Possible attacks, countermeasures, SPINS, Static and dynamic key distribution	(08)
Unit 5	**Routing protocols:** Introduction, MANET protocols Routing protocols for WSN: Resource-aware routing, Data-centric, Geographic Routing, Broadcast, Multicast Opportunistic Routing Analysis: Analysis of opportunistic routing (Markov Chain) Advanced topics in wireless sensor networks.	(10)
Unit 6	**Advanced Topics:** Recent development in WSN standards, software applications	(04)

Text Books:

1 W. Dargie, C. Poellabauer, "Fundamentals of Wireless Sensor Networks –Theory and Practice", Wiley 2010.
2 Kazem Sohraby, Daniel Minoli, TaiebZnati, "Wireless sensor networks -Technology, Protocols,

and Applications", Wiley Inter science 2007.
3 Takahiro Hara, Vladimir I. Zadorozhny, Erik Buchmann, "Wireless Sensor Network Technologies for the Information Explosion Era", Springer 2010.

References:

1 Holger Kerl, Andreas Willig, "Protocols and Architectures for Wireless Sensor Network", John Wiley and Sons, 2005 (ISBN: 978-0-470-09511-9)
2 Raghavendra, Cauligi S, Sivalingam, Krishna M., Zanti Taieb, "Wireless Sensor Network", Springer 1st edition, 2004.
3 Kazem, Sohraby, Daniel Minoli, Taieb Zanti, "Wireless Sensor Network: Technology, Protocols and Application", John Wiley and Sons 1st edition 2007
4 Savo G. Glisic, "Advanced Wireless Networks: Technology and Business Models", Wiley Publication, 3rd edition.

Useful Links:

1 https://nptel.ac.in/courses/106105160 IIT, Kharagpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	1	2	-	-	-	-	-	-	1	1
CO2	-	1	2	1	-	-	-	-	-	-	2	2
CO3	-	1	2	1	-	-	-	-	-	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze				
Evaluate			1	10
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

CS133: Program Elective-I: Introduction to Intelligent Systems

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Demonstrate knowledge of the fundamental principles of intelligent systems.

2 Analyse and compare the relative merits of a variety of AI problem solving techniques

Course Contents

		Hours
Unit 1	**Biological foundations to intelligent systems I:** Artificial neural networks, Backpropagation networks, Radial basis function networks, and recurrent networks	(09)
Unit 2	**Biological foundations to intelligent systems II:** Fuzzy logic, knowledge Representation and inference mechanism, genetic algorithm, and fuzzy neural networks.	(06)
Unit 3	**Search Methods:** Basic concepts of graph and tree search. Three simple search methods: breadth-first search, depth-first search, iterative deepening search. Heuristic search methods: best-first search, admissible evaluation functions, hill climbing search. Optimization and search such as stochastic annealing and genetic algorithm.	(07)
Unit 4	**Knowledge representation and logical inference**: Issues in knowledge representation. Structured representation, such as frames, and scripts, semantic networks and conceptual graphs. Formal logic and logical inference. Knowledge-based systems structures, its basic components. Ideas of Blackboard architectures.	(07)
Unit 5	**Reasoning under uncertainty and Learning Techniques** on uncertainty reasoning such as Bayesian reasoning, Certainty factors and Dempster-Shafer Theory of Evidential reasoning, A study of different learning and evolutionary algorithms, such as statistical learning and induction learning	(05)
Unit 6	**Recent trends** in Fuzzy logic, Knowledge Representation	(05)

Text Books:

1 Luger G.F., Stubblefield W.A., "Artificial Intelligence: Structures and strategies for Complex Problem Solving", Addison Wesley, 6th edition, 2008.

2 Russell S., Norvig P., "Artificial Intelligence: A Modern Approach", Prentice-Hall, 3rd edition, 2009.

3 Martin T. Hagan, Howard B. Demuth, and Mark Beale, "Neural Network Design", PWS Publishing Company, Boston, 1996

References:

1 Grosan, Crina, Abraham, Ajith, "Intelligent Systems: A Modern Approach", Springer.

2 Geoff Hulten, "Building Intelligent Systems: A Guide to Machine Learning Engineering", Apress.

3 Luger G.F., Stubblefield W.A,"Artificial Intelligence: Structures and strategies for Complex Problem Solving" Addison Wesley, 6th edition.

4 Timothy S.Ross, "Fuzzy Logic with engineering applications", Weily India Pvt. Ltd., 2011

Useful Links:

1 https://nptel.ac.in/courses/106105077/ IIT, Kharagpur

2 https://nptel.ac.in/courses/108104049/ IIT, Kanpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	1	1	1	-	-	-	-	1	-	2	1
CO2	-	1	1	2	-	-	-	-	-	1	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze			1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-I) M. Tech. Computer Science & Engineering
CS114: Program Elective-II: Data Science

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Explain how data is collected, managed and stored for data science.
2 Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists.
3 Implement data collection and management scripts using MongoDB.

Course Contents

		Hours
Unit 1	**Introduction to core concepts and technologies:** Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications	(06)
Unit 2	**Data collection and management:** Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources	(07)
Unit 3	**Data analysis:** Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.	(10)
Unit 4	**Data visualisation:** Introduction, Types of data visualisation, Data for visualisation: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings	(11)
Unit 5	**Applications of Data Science**, Technologies for visualization, Bokeh (Python)	(07)
Unit 6	**Recent trends** in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science	(07)

Text Books:

1 Cathy O'Neil, Rachel Schutt, "Doing Data Science: Straight Talk From The Frontline", O'Reilly.
2 Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, "Mining of Massive Datasets", Cambridge University Press, v2.1.

References:

1 Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly.
2 Lillian Pierson, "Data Science For Dummies", John Wiley & Sons, 2nd edition.
3 V.K. Jain, "Data Science & Analytics", Khanna Book Publishing, New Delhi

4 Dinesh Kumar, “Business Analytics”, Wiley India

Useful Links:

1 https://nptel.ac.in/courses/106106179/ IIT, Madras

2 https://nptel.ac.in/courses/110106064/ IIT, Madras

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	1	1	-	-	-	-	1	1	2	1
CO2	-	-	2	1	-	-	-	-	1	1	1	2
CO3	-	1	2	2	-	-	-	-	-	1	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember			3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze				
Evaluate	5	5	1	10
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

CS124: Program Elective-II: Advanced Distributed Systems

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Design trends in distributed systems.
2 Apply network virtualization.
3 Apply remote method invocation and objects

Course Contents

		Hours
Unit 1	**Introduction:** Distributed data processing, Definition DDBS, Advantages and disadvantages of DDBS, Problem areas, Overview of database and computer network concepts. Distributed database management system architecture: Transparencies in a distributed DBMS, Distributed DBMS architecture, Global directory issues.	(08)
Unit 2	**Distributed database design:** Alternative design strategies, Distributed design issues, Fragmentation, Data allocation Semantics data control: View management; Data security, Semantic Integrity Control Query processing issues: Objectives of query processing; Characterization of query processors, Layers of query processing, Query decomposition, Localization of distributed data.	(11)
Unit 3	**Distributed query optimization:** Factors governing query optimization, Centralized query optimization, Ordering of fragment queries, Distributed query optimization algorithms Transaction management: The transaction concept, Goals of transaction management; Characteristics of transactions, Taxonomy of transaction models Concurrency control: Concurrency control in centralized database systems, Concurrency control in DDBSs, Distributed concurrency control algorithms, Deadlock management	(11)
Unit 4	**Reliability:** Reliability issues in DDBSs, Types of failures, Reliability techniques, Commit protocols, Recovery protocols	(08)
Unit 5	**Parallel database systems:** Parallel architectures, parallel query processing and optimization, load balancing	(06)
Unit 6	**Advanced topics:** Mobile Databases, Distributed Object Management, Multi-databases	(04)

Text Books:

1 M.T. Ozsu, P. Valduriez, "Principles of Distributed Database Systems", Prentice-Hall, 1991.

2 D. Bell, J. Grimson, "Distributed Database Systems", Addison-Wesley, 1992.

References:

1 Andrew S. Tanenbaum, "Distributed Systems: Principles and Paradigms", Pearson Prentice Hall, 2nd edition, 2007.

2 George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts and Design", Pearson Publication, 4th edition.

3 Pradeep K. Sinha "Distributed Operating Systems", Prentice Hall of India Private Limited

4 Thomas Erl, "Service Oriented Architecture : Concepts, Technology and Design" Prentice Hall

5 G. Coulouris, J. Dollimore, T. Kindberg, "Distributed Systems: Concepts and Design",Addison Wesley; 4th edition

Useful Links:

1 https://nptel.ac.in/courses/106106168/ IIT, Patna

2 https://nptel.ac.in/courses/106106107/ IIT, Madras

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	1	2	-	-	-	-	-	-	1	1
CO2	1	2	-	2	-	-	-	-	-	-	1	1
CO3	-	1	1		-	-	-	-	-	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	20
Understand	5	5	3	20
Apply	5	5	3	10
Analyze			1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

CS134: Program Elective-II: Advanced Mobile Computing

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Demonstrate advanced knowledge of networking and wireless networking and understand various types of wireless networks, standards, operations and use cases.
2 Design WLAN, WPAN, WWAN and Cellular based upon underlying propagation and performance analysis.
3 Demonstrate knowledge of protocols used in wireless networks and learn simulating wireless networks.
4 Design wireless networks exploring trade-offs between wire line and wireless links.
5 Develop mobile applications to solve some of the real world problems.

Course Contents

		Hours
Unit 1	**Introduction:** Wireless Networking Trends, Key Wireless Physical Layer Concepts, Multiple Access Technologies -CDMA, FDMA, TDMA, Spread Spectrum technologies, Frequency reuse, Radio Propagation and Modelling, Challenges in Mobile Computing: Resource poorness, Bandwidth, energy etc. Wireless local area networks: IEEE 802.11 Wireless LANs Physical & MAC layer, 802.11 MAC Modes (DCF & PCF) IEEE 802.11 standards, Architecture & protocols, Infrastructure vs. Adhoc Modes, Hidden Node & Exposed Terminal Problem, Problems, Fading Effects in Indoor and outdoor WLANs, WLAN Deployment issues	(11)
Unit 2	**Wireless cellular networks:** 1G and 2G, 2.5G, 3G, and 4G, Mobile IPv4, Mobile IPv6, TCP over Wireless Networks, Cellular architecture, Frequency reuse, Channel assignment strategies, Handoff strategies, Interference and system capacity, Improving coverage and capacity in cellular systems, Spread spectrum Technologies.	(10)
Unit 3	**WiMAX** (Physical layer, Media access control, Mobility and Networking), IEEE 802.22, Wireless Regional Area Networks, IEEE 802.21 Media Independent Handover Overview Wireless sensor networks: Introduction, Application, Physical, MAC layer and Network Layer, Power Management, Tiny OS Overview	(08)
Unit 4	**Wireless PANs:** Bluetooth AND Zigbee, Introduction to Wireless Sensors	(04)
Unit 5	**Security:** Security in wireless Networks Vulnerabilities, Security techniques, Wi-Fi Security, DoS	

in wireless communication. (10)

Unit 6 **Advanced topics:**
IEEE 802.11x and IEEE 802.11i standards, Introduction to Vehicular Adhoc Networks (05)

Text Books:

1 Schiller J., "Mobile Communications", Addison Wesley, 2000.
2 Stallings W., "Wireless Communications and Networks", Pearson Education, 2005.
3 Stojmenic Ivan, "Handbook of Wireless Networks and Mobile Computing", John Wiley and Sons Inc, 2002.

References:

1 Yi Bing Lin, Imrich Chlamtac, "Wireless and Mobile Network Architectures", John Wiley and Sons Inc, 2000.
2 Pandya Raj, "Mobile and Personal Communications Systems and Services", PHI, 2000.

Useful Links:

1 https://nptel.ac.in/courses/106105160/ IIT, Kharagpur
2 https://nptel.ac.in/courses/106105081/ IIT, Kharagpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	-	1	-	-	-	-	1	1	1	1
CO2	-	-	1	1	-	-	-	-	-	-	2	1
CO3	-	1	1	1	-	-	-	-	1	1	2	1
CO4	-	-	1	-	-	-	-	-	1	1	1	1
CO5	-	1	1	2	-	-	-	-	1	1	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember			3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze	5	5	1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-I) M. Tech. Computer Science & Engineering
OE118: Open Elective: Business Analytics

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Demonstrate knowledge of data analytics.
2 Demonstrate the ability of think critically in making decisions based on data and deep analytics.
3 Demonstrate the ability to use technical skills in predicative and prescriptive modelling to support business decision-making.
4 Demonstrate the ability to translate data into clear, actionable insights.

Course Contents

Hours

Unit 1 **Business analytics**:
Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics.
Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview. (09)

Unit 2 **Trendiness and Regression Analysis:**
Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology (08)

Unit 3 **Organization Structures of Business analytics**:
Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization (09)

Unit 4 **Forecasting Techniques:**
Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model. (10)

Unit 5 **Decision Analysis:**
Formulating Decision Problems, Decision Strategies with the without Outcome

Probabilities, Decision Trees, The Value of Information, Utility and Decision Making. (08)

Unit 6 Recent trends:

Recent Trends in Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism. (04)

Text Books:

1 Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, "Business analytics Principles, Concepts, and Applications", Pearson FT Press, 2014.

2 James Evans, "Business Analytics", persons Education, 2nd edition, 2015.

References:

1 Jeffrey D. Camm , James J. Cochran , Michael J. Fry , Jeffrey W. Ohlmann , David R. Anderson, "Business Analytics", South-Western College Pub; 3rd edition,2018.

2 S. Christian Albright, Wayne L. Winston, "Business Analytics: Data Analysis & Decision Making" ,South-Western College Pub; 6th edition, 2016

Useful Links:

1 https://nptel.ac.in/courses/110105089/ IIT Kharagpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	2	1	1	-	-	-	-	-	1	1
CO2	-	1	1	2	1	-	-	-	-	-	1	1
CO3	-	1	1	1	2	-	-	-	-	-	1	2
CO4	-	1	-	2	2	-	-	-	-	-	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply		5	3	20
Analyze	5		1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

OE128: Open Elective: Industrial Safety

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand and use of industrial safety techniques and fundamentals of industrial safety.

2 Explain the periodic and preventive maintenance concepts.

Course Contents

Hours

Unit 1 **Industrial safety:**
Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc., Safety colour codes. Fire prevention and firefighting, equipment and methods. (08)

Unit 2 **Fundamentals of maintenance engineering:**
Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment. (06)

Unit 3 **Wear and Corrosion and their prevention:**
Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications: Screw down grease cup, Pressure grease gun, Splash lubrication, Gravity lubrication, Wick feed lubrication Side feed lubrication, Ring lubrication, Definition, principle and factors affecting the corrosion, Types of corrosion, corrosion prevention methods. (10)

Unit 4 **Fault tracing:**
Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, Any one machine tool, Pump, Air compressor. Internal combustion engine, Boiler, Electrical motors, Types of faults in machine tools and their general causes. (10)

Unit 5 **Periodic and preventive maintenance:**
Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. (10)

Unit 6 **Steps/procedure for periodic and preventive maintenance of**: i. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance (04)

Text Books:

1 Lester Coridon Morrow Lindley R. Higgins, "Maintenance engineering handbook", McGraw-Hill, 3rd edition, 1977.

2 H.P. Garg," Industrial Maintenance", S. Chand and Co; 3rd edition,1987.

References:

1 Audels, "Pump-hydraulic Compressors", Mcgrew Hill Publication.

2 Winterkorn, "Hans Foundation Engineering Handbook", Chapman & Hall London.

Useful Links:

1 https://nptel.ac.in/courses/110105094/ IIT Kharagpur

2 https://nptel.ac.in/courses/112107143/ IIT Roorkee

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	2	-	-	1	1	-	-	1	1	1
CO2	-	-	2	-	-	1	1	-	-	1	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5		3	20
Analyze		5	1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

OE138: Open Elective: Operations Research

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Apply the dynamic programming to solve problems of discreet and continuous variables.
2 Apply the concept of non-linear programming.
3 Understand the sensitivity analysis.
4 Model the real-world problem and simulate it.

Course Contents

		Hours
Unit 1	**Optimization Techniques:** Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.	(09)
Unit II	**Formulation of a LPP:** Graphical solution revised simplex method, duality theory, dual simplex method, sensitivity analysis, parametric programming	(08)
Unit III	**Nonlinear programming problem**: Kuhn-Tucker conditions min cost flow problem, max flow problem, CPM/PERT	(06)
Unit IV	**Scheduling and sequencing:** Single server and multiple server models, deterministic inventory models, Probabilistic inventory control models, Geometric Programming.	(09)
Unit V	**Competitive Models:** Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks,	(08)
Unit VI	**Graph Theory:** Elementary Graph Theory, Game Theory Simulation.	(04)

Text Books:

1 H.A. Taha, "Operations Research, An Introduction", PHI, 2008.
2 H.M. Wagner, "Principles of Operations Research", PHI, Delhi, 1982.
3 J. C. Pant, "Introduction to Optimisation: Operations Research", Jain Brothers, Delhi, 2008.

References:

1 Hitler Libermann "Operations Research",McGraw Hill Pub. 2009.
2 Pannerselvam, "Operations Research",,Prentice Hall of India 2010.

3 Harvey M Wagner, “Principles of Operations Research”, Prentice Hall of India 2010.

Useful Links:

1 https://nptel.ac.in/courses/110106062/ IIT Madras

2 https://nptel.ac.in/courses/112106134/ IIT Madras

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	1	2	1	1	-	-	-	-	-	1	1
CO2	1	1	2	2	2	-	1	-	-	-	2	1
CO3	1	2	1	2	-	-	1	-	-	-	1	1
CO4	1	2	1	1	-	-	-	-	-	-	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5		3	10
Analyze		5	1	20
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

OE148: Open Elective: Cost Management of Engineering Projects

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand the knowledge cost management process and project.

2 Explain Quantitative techniques for cost management.

Course Contents

		Hours
Unit 1	**Introduction and Overview of the Strategic Cost Management Process:** Cost concepts in decision-making, Relevant cost, Differential cost, Incremental cost and Opportunity cost, Objectives of a Costing System, Inventory valuation, Creation of a Database for operational control, Provision of data for Decision-Making	(09)
Unit 2	**Project:** Meaning, Different types, why to manage, cost overruns centers, various stages of project **Execution:** conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents	(09)
Unit 3	**Project Team:** Role of each member, Importance Project site, Data required with significance, Project contracts, Types and contents. Project execution Project cost control. Bar charts and Network diagram.	(08)
Unit 4	**Project commissioning:** Project commissioning: mechanical and process, Cost Behavior and Profit Planning Marginal Costing, Distinction between Marginal Costing and Absorption Costing, Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. **Pricing strategies:** Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector	(10)
Unit 5	**Planning and Management:** Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control, Flexible Budgets, Performance budgets, Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.	(08)

Unit 6 Quantitative techniques for cost management:
Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory. (04)

Text Books:

1 "Cost Accounting A Managerial Emphasis", Prentice Hall of India, New Delhi.
2 Charles T. Horngren and George Foster, "Management & Cost Accounting".
3 Robert S Kaplan Anthony A. Alkinson,"Management & Cost Accounting".

References:

1 Ashish K. Bhattacharya, "Principles & Practices of Cost Accounting",A. H. Wheeler publisher.
2 N.D. Vohra, "Quantitative Techniques in Management", Tata McGraw Hill Book Co. Ltd.

Useful Links:

1 https://nptel.ac.in/courses/105104161/8 IIT Kanpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	-	1	-	-	-	1	-	2	2	2	1
CO2	1	-	1	-	-	-	2	-	1	1	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5		3	20
Analyze		5	1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

OE158: Open Elective: Composite Materials

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand manufacturing of metal matrix composites.

2 Explain the basics of Manufacturing of polymer matrix composites.

Course Contents

		Hours
Unit 1	**Introduction:** Definition, Classification and characteristics of Composite materials, Advantages and application of composites, Functional requirements of reinforcement and matrix, Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.	(09)
Unit 2	**Reinforcements:** Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures, Isostrain and Isostress conditions.	(08)
Unit 3	**Manufacturing of Metal Matrix Composites**: Casting: Solid State diffusion technique, Cladding: Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites, Liquid Metal Infiltration, Liquid phase sintering, Manufacturing of Carbon Carbon composites: Knitting, Braiding, Weaving. Properties and applications.	(10)
Unit 4	**Manufacturing of Polymer Matrix Composites:** Preparation of Molding compounds and prepregs, hand layup method, Autoclave method, Filament winding method, Compression molding , Reaction injection molding, Properties and applications	(07)
Unit 5	**Strength:** Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure, Laminate first play failure-insight strength,	(09)
Unit 6	**Laminate strength**-ply discount truncated maximum strain criterion, strength design using caplet plots, Stress concentrations.	(04)

Text Books:

1 R.W.Cahn," Material Science and Technology – Vol 13" Composites by VCH, West Germany.

2 WD Callister, Jr., Adapted by R. Balasubramaniam, "Materials Science and Engineering, An introduction". John Wiley & Sons, NY, Indian edition, 2007.

References:

1 Lubin." Hand Book of Composite Materials".

2 K.K.Chawla. "Composite Materials".

3 Deborah D.L. Chung "Composite Materials Science and Applications".

4 Danial Gay, Suong V. Hoa, and Stephen W. Tasi." Composite Materials Design and Applications".

Useful Links:

1 https://nptel.ac.in/courses/101104010/ IIT Kanpur

2 https://nptel.ac.in/courses/112104229/ IIT Kanpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1			1			1	2	1		1	1	1
CO2			1			2	1		1	1	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5		3	10
Analyze		5	1	20
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-I) M. Tech. Computer Science & Engineering
OE168: Open Elective: Waste to Energy

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand the use of waste to energy concepts.
2 Aware about Biomass, Biogas and its applications.

Course Contents

		Hours
Unit 1	**Introduction to Energy from Waste:** Classification of waste as fuel, Agro based, Forest residue, Industrial waste, MSW, Conversion devices, Incinerators, gasifiers, digesters	(07)
Unit 2	**Biomass Pyrolysis:** Types, slow fast, Manufacture of charcoal, Methods, Yields and application, Manufacture of pyrolytic oils and gases, yields and applications	(08)
Unit 3	**Biomass Gasification:** Gasifiers , Fixed bed system, Downdraft and updraft gasifiers, Fluidized bed gasifiers, Design, construction and operation, Gasifier burner arrangement for thermal heating, Gasifier engine arrangement and electrical power , Equilibrium and kinetic consideration in gasifier operation.	(09)
Unit 4	**Biomass Combustion:** Biomass stoves, Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.	(08)
Unit 5	**Biogas:** Properties of biogas (Calorific value and composition), Biogas plant technology and status, Bio energy system, Design and constructional features, Biomass resources and their classification, Biomass conversion processes, Thermochemical conversion, Direct combustion, biomass gasification, pyrolysis and liquefaction, biochemical conversion , anaerobic digestion , Types of biogas Plants	(12)
Unit 6	**Applications:** Alcohol production from biomass, Bio diesel production and Urban waste to energy conversion, Biomass energy programme in India.	(04)

Text Books:

1 Desai, Ashok V , "Non-Conventional Energy", Wiley Eastern Ltd., 1990

2 Khandelwal, K. C. and Mahdi, S. S., "Biogas Technology - A Practical Hand Book",Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.

References:

1 Challal, D. S Food, "Feed and Fuel from Biomass", IBH Publishing Co. Pvt. Ltd., 1991.

2 C. Y. WereKo-Brobby and E. B. Hagan," Biomass Conversion and Technology", John Wiley & Sons, 1996.

Useful Links:

1 https://nptel.ac.in/courses/103107125/ IIT Roorkee.

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	-	1	1	2	2	1	2
CO2	-	-	-	-	-	-	1	1	2	2	1	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze			1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

AU119: Audit Course – I: Research Paper Writing

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CT1**	-
Tutorial	--	**CT2**	-
Total Credits	Audit	**TA**	-
		ESE	-
		Duration of ESE:	

Course Outcome (CO): After completion of course, students would be able to:

1 Improve writing skills and level of readability.
2 Understand what to write in each section.
3 Upgrade the skills needed when writing a title.

Course Contents

		Hours
Unit 1	**Planning and Preparation:** Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	(04)
Unit 2	**Clarifying Who Did What**: Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	(04)
Unit 3	**Review of the Literature:** Methods, Results, Discussion, Conclusions, The Final Check.	(04)
Unit 4	**Key skills are needed when writing a Title:** key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature	(04)
Unit 5	**Skills are needed when writing the Methods:** skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	(04)
Unit 6	**Useful phrases**: how to ensure paper is as good as it could possibly be the first- time submission	(04)

Text Books:

1 Goldbort R, "Writing for Science", Yale University Press (available on Google Books) 2006.
2 Day R, "How to Write and Publish a Scientific Paper", Cambridge University Press, 2006.

References:

1 Highman N, "Handbook of Writing for the Mathematical Sciences", SIAM, Highman's book, 1998.
2 Adrian Wallwork, "English for Writing Research Papers", Springer New York Dordrecht Heidelberg London, 2011.

Useful Links:

1 https://nptel.ac.in/courses/109106094/34 IIT Madras

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	1	1	2	1	2	-	-	1
CO2	-	-	-	-	1	1	2	1	2	-	-	1
CO3	-	-	-	-	1	1	1	1	2	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

AU129: Audit Course – I: Disaster Management

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CT1**	-
Tutorial	--	**CT2**	-
Total Credits	Audit	**TA**	-
		ESE	-
		Duration of ESE:	

Course Outcome (CO): After completion of course, students would be able to:

1. Understand key concepts in disaster risk reduction and humanitarian response.
2. Evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

Course Contents

		Hours
Unit 1	**Introduction:** Disaster: Definition, Factors and Significance, Difference Between Hazard And Disaster, Natural and Manmade Disasters: Difference, Nature, Types And Magnitude.	(04)
Unit 2	**Repercussions of Disasters And Hazards:** Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.	(04)
Unit 3	**Disaster Prone Areas in India Study of Seismic Zones:** Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards With Special Reference to Tsunami; Post-Disaster Diseases and Epidemics	(04)
Unit 4	**Disaster Preparedness and Management Preparedness:** Monitoring of Phenomena Triggering A Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and other Agencies, Media Reports: Governmental and Community Preparedness.	(04)
Unit 5	**Risk Assessment Disaster Risk**: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Cooperation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.	(04)
Unit 6	**Disaster Mitigation Meaning:** Concept And Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.	(04)

Text Books:

1 R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies", New Royal Book company.

2 Sahni, Pardeep Et.Al. (Eds.),"Disaster Mitigation Experiences And Reflections", Prentice Hall Of India, New Delhi.

References:

1 Goel S. L., "Disaster Administration And Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi.

Useful Links:

1 https://nptel.ac.in/courses/105104183 IIT Kanpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	2	2	-	1	-	-	1	-	2	1
CO2	-	1	2	1	-	1	-	-	1	-	2	1
CO3	-	1	2	1	-	1	-	-	1	-	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

AU139: Audit Course – I: Sanskrit for Technical Knowledge

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CT1**	-
Tutorial	--	**CT2**	-
Total Credits	Audit	**TA**	-
		ESE	-
		Duration of ESE:	

Course Outcome (CO): After completion of course, students would be able to:

1 Understanding basic Sanskrit language.
2 Acquire the knowledge of ancient Sanskrit literature about science & technology.
3 Being a logical language that will help to develop logic in students.

Course Contents

		Hours
Unit 1	Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences.	(04)
Unit 2	Order, Introduction of roots.	(04)
Unit 3	Technical information about Sanskrit Literature.	(04)
Unit 4	Technical concepts of Engineering-Electrical.	(04)
Unit 5	Technical concepts of Engineering - Mechanical, Architecture.	(04)
Unit 6	Technical concepts of Engineering – Mathematics.	(04)

Text Books:

1 Dr.Vishwas, "Abhyaspustakam", Samskrita-Bharti Publication, New Delhi.
2 Prathama Deeksha-Vempati Kutumbshastri, "Teach Yourself Sanskrit", Rashtriya Sanskrit Sansthanam, New Delhi Publication.

References:

1 Suresh Soni, "India's Glorious Scientific Tradition", Ocean books (P) Ltd., New Delhi.

Useful Links:

1 https://nptel.ac.in/courses/109105135/ IIT Kharagpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	-	1	2	-	-	1	1	-	-	1	-
CO2	1	-	2	1	-	-	1	1	-	-	1	-
CO3	1	-	1	1	-	-	1	2	-	-	1	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad

First Year (Sem-I) M. Tech. Computer Science & Engineering

AU149: Audit Course – I: Value Education

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CT1**	-
Tutorial	--	**CT2**	-
Total Credits	Audit	**TA**	-
		ESE	-
		Duration of ESE:	

Course Outcome (CO): After completion of course, students would be able to:

1 Acquire the knowledge of self-development.
2 Learn the importance of Human values.
3 Developing the overall personality.

Course Contents

		Hours
Unit 1	**Values and self-development:** Social values and individual attitudes. Work ethics, Indian vision of humanism, Moral and non- moral valuation. Standards and principles, Value judgments.	(04)
Unit 2	**Importance of cultivation of values:** Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness, Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline.	(04)
Unit 3	**Personality and Behavior Development:** Soul and Scientific attitude, Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labor, Universal brotherhood and religious tolerance.	(04)
Unit 4	**True friendship:** Happiness Vs suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature.	(04)
Unit 5	**Character and Competence:** Holy books vs Blind faith, Self-management and Good health, Science of reincarnation, Equality, Nonviolence, Humility.	(04)
Unit 6	**Role of Women:** All religions and same message, Mind your Mind, Self-control, Honesty, Studying effectively.	(04)

Text Books:

1 Chakroborty, S.K., "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi.

References:

1 Saxena A, "Human Values And Professonal Ethics", Vayu Education Of India, 2012

Useful Links:

1 https://nptel.ac.in/courses/109104068/ IIT Kanpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	-	2	1	-	-	2	1	2	-	-	1
CO2	1	-	2	1	-	-	2	1	1	-	-	1
CO3	1	-	1	2	-	-	2	1	2	-	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad
First Year (Sem-II) M. Tech. Computer Science & Engineering
CS201: Advanced Computer Networks

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand basic concepts of internetworking.
2 Explain software defined network.
3 Describe fundamentals of storage network and management.

Course Contents

		Hours
Unit 1	**Internetworking:** Routing Algorithms, Congestion Control, Quality of Service, Queue Management, High Speed Networks, Performance Modeling and Estimation.	(06)
Unit 2	**IPv6:** IPv4 deficiencies, patching work done with IPv4, IPv6 addressing, multicast, Anycast,ICMPv6, Neighbour discovery, Routing	(08)
Unit 3	**Software Defined Networking and OpenFlow:** Centralized and Distributed Control and Data Planes, SDN Controllers, Data Center Concepts, Network Function Virtualization, Mininet, Programming SDNs, Openflow Switch, Wire Protocol, Openstack Neutron plug-in.	(09)
Unit 4	**Ad Hoc Wireless Networks:** MAC Protocols for Ad Hoc Wireless Networks, Routing Protocols for Ad Hoc Wireless Networks, Multicast routing in Ad Hoc Wireless Networks, Transport Layer and Security Protocols for Ad Hoc Wireless Networks, Quality of Service in Ad Hoc Wireless Networks.	(10)
Unit 5	**Network management Protocols:** SNMPv1 Network Management: Organization and Information Models, SNMPv2: major changes, SNMPv3, RMON, Network Management Tools, Systems, and Engineering, Network Management Applications	(10)
Unit 6	**Storage and Networking:** Storage and Networking Concepts, Fiber Channel Internals, Fiber Channel SAN Topologies, Fiber Channel Products, IP SAN Technology, IP SAN Products, Management of SANs, SAN Issues	(05)

Text Books:

1 William Stallings, "High-Speed Networks and Internets", Pearson Education, 2nd Edition, 2002.
2 Thomas D Nadeau, Ken Grey, "Software Defined Networking", O'Reilly, 2013.
3 Pete Loshin, "IPv6, Theory, Protocols and Practice", Morgan Kaufmann, 2nd Edition, 2004.

References:

1 Mani Subramanian, Timothy A. Gonsalves, N. Usha Rani, "Network Management: Principles

and Practice", Pearson Education India, 2010.
2 C. Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols", Prentice Hall, 2004.
3 B. Muthukumaran, "Introduction to High Performance Networks", Tata Mc Graw Hill, 2008.
4 Tom Clark, "Designing Storage Area Networks,A Practical Reference for Implementing Fibre Channel and IP SANs", Addison-Wesley Professional, 2nd Edition, 2003.

Useful Links:

1 https://nptel.ac.in/courses/106105160/
2 https://nptel.ac.in/courses/106108058/

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	-	2	-	-	-	-	-	-	1	1	1
CO2	1	2	2	2	-	-	-	-	-	1	1	1
CO3	1	2	-	2	-	-	-	-	1	1	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember			3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze	5	5	1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-II) M. Tech. Computer Science & Engineering
CS202: Soft Computing

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60

Duration of ESE: 2 Hrs 30 Min

Course Outcome (CO): After completion of course, students would be able to:

1 Identify and describe soft computing techniques and their roles in building intelligent machines
2 Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.
3 Apply genetic algorithms to combinatorial optimization problems.
4 Evaluate and compare solutions by various soft computing approaches for a given problem.

Course Contents

		Hours
Unit 1	**Introduction to soft computing and neural Networks:** Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics.	(07)
Unit 2	**Fuzzy logic:** Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.	(08)
Unit 3	**Neural networks:** Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks: Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks.	(10)
Unit 4	**Genetic algorithms:** Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning: Machine Learning Approach to Knowledge Acquisition.	(05)
Unit 5	**Matlab/Python Lib:** Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic.	(13)
Unit 6	**Recent Trends** in deep learning, various classifiers, neural networks and genetic algorithm. Implementation of recently proposed soft computing techniques.	(05)

Text Books:

1 Shing Roger Jang, Chuen,Tsai Sun, EijiMizutani, "Neuro:Fuzzy and Soft Computing", Prentice:Hall of India, 2003.
2 George J. Klir, Bo Yuan, "Fuzzy Sets and Fuzzy Logic: Theory and Applications", Prentice Hall, 1995.

References:

1 Sivanandam & Deepa, "Principles of Soft Computing", Wiley India.

2 S. Rajasekaram & G.A. Vijyalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI.

3 MATLAB Toolkit Manual.

Useful Links:

1 https://nptel.ac.in/courses/106105173/ IIT Kharagpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	1	-	-	-	-	-	1	-	1	1
CO2	-	2	1	1	-	-	-	-	-	-	1	1
CO3	-	2	1	1	-	-	-	-	1	-	1	1
CO4	1	-	-	-	-	-	-	-	-	-	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze				
Evaluate			1	10
Create				
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-II) M. Tech. Computer Science & Engineering
CS206: Laboratory 3 (Based on Cores)

Laboratory Scheme		**Examination Scheme**	
Practical	4 Hrs/week	**CA**	25
Total Credits	**2**	**ESE**	25

Course Outcome(CO): After completion of course, students would be able to:

1 Configure and implement different servers and protocols.
2 Design real world application using soft computing techniques.

Course Contents

Advanced Computer Networks

Experiment 1 Introduction to the basic router configuration and basic commands. Configuration and logging to a CISCO router and introduction to the basic user interfaces.

Experiment 2 Configuration of IP addressing for a given scenario for a given set of topologies.

Experiment 3 Configure a DHCP server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS binaries based on client MAC address.

Experiment 4 Configure, implement and debug the following: Use open source tools for debugging and diagnostics. a. ARP/RARP protocols b. RIP routing protocols c. BGP routing d. OSPF routing protocols e. Static routes (check using netstat).

Experiment 5 Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterise traffic when the DNS server is up and when it is down.

Experiment 6 Configure FTP server on a Linux/Windows machine using a FTP client/SFTP client characterise file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment.

Experiment 7 Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails.

Experiment 8 Implement Open NMS+ SNMPD for checking device status of devices in community MIB of a linux PC using yellow pages and NIS/NFS protocols.

Experiment 9 Implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterise the NAS traffic using wireshark.

Soft Computing

Experiment 10 Write a program to implement Fuzzy Operations.

Experiment 11 Write a program to implement Simple Neural Network

Experiment 12 Write a program to implement Perceptron Learning Algorithm

Experiment 13 Write a program to implement Unsupervised Learning Algorithm

Experiment 14 Write a program to implement Simple Genetic Application

Experiment 15 Write a program for Back propagation Algorithm

Experiment 16 Study of Soft Computing tools.

Experiment 17 A Mini project: may include classification or regression problem, using any soft computing technique

List of Submission:

2. Total number of Experiments : 16

Mapping of COs and POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	1	1	1	1
CO2	-	1	1	2	-	-	-	-	1	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 18	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	
Task II	5	5	5	5	5	5	5	5	5	5	5	
Task III	5	5	5	5	5	5	5	5	5	5	5	
CA												

Government College of Engineering, Karad
First Year (Sem-II) M. Tech. Computer Science & Engineering
CS207: Laboratory 4 (Based on Elective III & IV)

Laboratory Scheme		**Examination Scheme**	
Practical	4 Hrs/week	**CA**	50
Total Credits	**2**	**ESE**	--

Course Outcome(CO): After completion of course, students would be able to:

1. Explain the basics of data preparation and analysis.
2. Installation and configuration of network services and web services.
3. Perform operations on image, face detection and face recognition.
4. Create HCI applications.
5. Demonstrate GPU implementation of Matrix-Matrix operations.
6. Explain digital forensics concepts.

Course Contents

Group A - Data Preparation and Analysis

Experiment 1	Installation of Python, Pandas and NumPy.
Experiment 2	Write a program to perform data gathering and preparation methods.
Experiment 3	Write a program to perform data wrangling techniques.
Experiment 4	Write a program to perform data cleaning operations.
Experiment 5	Create an application to visualize data using Python.
Experiment 6	Write a program to perform Exploratory analysis in Python using Pandas.

Group B - Secure Software Design & Enterprise Computing

Experiment 7	Installation of administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email).
Experiment 8	Perform security testing and quality assurance of application using testing tools.
Experiment 9	Create application to produce, invoke, and compose web services using SOAP, WSDL and UDDI.
Experiment 10	Create application to implement and integrate the components of the target system using .NET / J2EE platforms adhering to service specifications
Experiment 11	Case study of DNS server, DHCP configuration.
Experiment 12	Case study of SQL injection attack.

Group C - Computer Vision

Experiment 13	Installation of Python and OpenCV.
Experiment 14	Write a program to draw shapes and writing text on an image.
Experiment 15	Write a program for image segmentation using colour spaces in OpenCV and Python.
Experiment 16	Write a program for face detection in Python using a Webcam.
Experiment 17	Write a program to load a video and save a video in a different format.
Experiment 18	Write a program for face recognition in Python using a webcam.

Group D - Human and Computer Interaction

Experiment 19	To understand the trouble of interacting with machines - Redesign interfaces of home appliances.
Experiment 20	Write a program to design a system based on user centred approach.
Experiment 21	Write a program to design web user interface based on Gestalt Theory.
Experiment 22	Create application for speech recognition.

Experiment 23 Create application using different web interfaces.

Experiment 24 Create HCI Application using Gesture Recognition.

Group E - GPU Computing

Experiment 25 Installation of CUDA.

Experiment 26 Parallel GPU implementation of vector-vector operations.

Experiment 27 Parallel GPU implementation of vector-Matrix operations.

Experiment 28 Parallel computation of binomial coefficient matrix.

Experiment 29 Parallel GPU implementation of Matrix-Matrix operations.

Experiment 30 GPU Programming with Python.

Group F - Digital Forensics

Experiment 31 Write a computer forensic application program in Java/Python/C++ for recovering deleted files and deleted partitions.

Experiment 32 Perform network analysis using the network miner tool.

Experiment 33 Write a program in C++ /Python to analyse email header.

Experiment 34 Write a program to implement a packet sniffing tool in C++/Java/Python.

Experiment 35 Write a program to implement a fingerprint recognition using Java Programming

Experiment 36 A person on a nearby road is trying to enter into a WiFi network by trying to crack the Password to use the IP printer resource; write a program in Java/Python/C++ to detect such attempt and prohibit the access.

List of Submission:

2. Total number of Experiments :

Solve any two group experiments of respective elective subjects.

Mapping of COs and POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	2	1	1	-	1	1	-	1	-	2	1
CO2	-	2	1		-	1		-	1	-	2	1
CO3	-	1	1	1	-	1	1	-	1	-	1	2
CO4	-	2	1		-	1	1	-	1	-	2	1
CO5	-	1	1	1	-	1		-	1	-	2	1
CO6	-	2	1	1	-	1	1	-	1	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern

Skill Level (as per CAS Sheet)	Exp 1	Exp 2	Exp 3	Exp 4	Exp 5	Exp 6	Exp 7	Exp 8	Exp 9	Exp 10	Exp 36	Avg
Task I	15	15	15	15	15	15	15	15	15	15	15	
Task II	5	5	5	5	5	5	5	5	5	5	5	
Task III	5	5	5	5	5	5	5	5	5	5	5	
CA												

Government College of Engineering, Karad
First Year (Sem-II) M. Tech. Computer Science & Engineering
CS208: Seminar

Laboratory Scheme		**Examination Scheme**	
Practical	4Hrs/week	**CA**	**100**
Total Credits	**2**	**ESE**	**--**

Course Outcome(CO): After completion of course, students would be able to:

1 Explore the information about recent trends in relevant field.
2 Identify the research area in computer science and engineering.
3 Prepare and present research work.

Course Contents

Seminar should be based on the literature survey on any topic relevant to computer science and engineering. It may be leading to selection of a suitable topic of dissertation. Each student has to prepare a write up of about 25 pages. The report typed on A4 sized sheets and bound in necessary format should be submitted after approved by the guide and endorsement of Head of Department. The student has to deliver a similar talk in front of the faculty of the department and the students. The assessment of the seminar will based on the quality of work, preparation and understanding of the candidate, depth of knowledge and presentation skills. The assessment of the seminar will be done by the panel of faculty members.

Students should deliver seminar individually. It should consist of a talk of 30 minutes on a topic preferably from the area in which a student intends to work for his project work in final year M. Tech or any upcoming technology not covered in syllabus.

Selection of Seminar Topic

1. Select a seminar topic relevant to Computer Science and Engineering. For selection topics refer Scopus Index Journal papers and innovative ideas.
2. Get the topic approved by the seminar guide well in advance.

Preparation

1. Research the topic well. Find relevant information related to topic.
2. The presentation slides should include list of key points, figures, charts and tables. There should not be running paragraphs.
3. The slides should be readable – Font size used should be at least 20.
4. The figures, tables etc. should be relevant to content and should not be for only namesake.
5. Figures should be very clear. Develop the habit of drawing your own figures using suitable software tools for better clarity.
6. For the presentation, adopt simple themes; avoid unnecessary animation and sound effects.
7. The presentation should be approved by the seminar guide for corrections if any.
8. A report of the seminar should contain the following and report should be prepared by using Latex.
    a. Title of the seminar.
    b. Abstract of the topic.
    c. Name and other details of student and the guide.
    d. List of references strictly in IEEE format.

Presentation

1. Keep a hand-out of presentation. This will help organise the talk better.
2. There should be proper self-introduction at the beginning.
3. Introduce the topic and highlight its significance.
4. Have good voice projection; deliver in modest pace; modulation of voice is desirable.
5. Keep eye contact with the audience.
6. Face the audience - Don't talk to the screen.
7. Familiarise with presentation aids.
8. Avoid repeated use of certain words/gestures.
9. Give a proper conclusion.

Assessment Guideline:

• Student has to meet weekly to the guide and whereas guide has to keep track on the progress of the seminar and also has to maintain attendance report. This progress report can be used for awarding CA marks.

• The seminar to be delivered by students should be assessed by a panel of at least two senior faculties within the department.

• The assessment for the seminar should include but not limited to following points.

1) Novelty of the topic
2) Technical depth
3) Organization of the topic
4) Presentation skills
5) Communication skills
6) Question-Answer session

List of Submission:

1. Seminar report should be prepared using Latex.

Mapping of COs and POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	1	2	1	3	3	-	1	3
CO2	-	-	-	-	1	2	2	3	3	-	1	3
CO3	-	-	-	-	1	2	1	3	3	-	1	3

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

CS213: Program Elective III: Data Preparation and Analysis

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE:	2 Hrs 30 Min

Course Outcome (CO): After completion of course, students would be able to:

1 Extract the data for performing the Analysis

Course Contents

		Hours
Unit 1	**Defining data analysis problems:** Knowing the client, understanding the questions.	(04)
Unit 2	**Data Gathering and Preparation:** Data formats, parsing and transformation, Scalability and real-time issues	(09)
Unit 3	**Data Cleaning:** Consistency checking, Heterogeneous and missing data, Data Transformation and segmentation	(09)
Unit 4	**Exploratory Analysis:** Descriptive and comparative statistics, Clustering and association, Hypothesis generation	(10)
Unit 5	**Visualization:** Designing visualizations, Time series, Geolocated data, Correlations and connections, Hierarchies and networks, interactivity	(10)
Unit 6	**Modelling tools and Data Preparation:** How Modelling tools drive data preparation, Decision trees, decision Lists, Neural Networks, Evolution Programs, Modelling data with tools, Missing Data and Modelling tools.	(06)

Text Books:

1 Glenn J. Myatt, "Making sense of Data: A practical Guide to Exploratory Data Analysis and Data Mining", Wiley-Blackwell, 2016

2 Dorian Pyle, "Data Preparation for Data Mining", Morgan Kaufmann; 1st edition, 1999.

References:

1 Anil Maheshwari, "Data Analytics", McGraw Hill Education; 1st edition, 2017.

Useful Links:

1 https://nptel.ac.in/courses/110104068/ IIT Kanpur

2 https://nptel.ac.in/courses/110107080/ IIT Roorkee

3 https://nptel.ac.in/courses/110106064/ IIT Madras

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	1	2	2	-	-	-	-	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	3	3	3	10
Understand	3	3	3	20
Apply	3	3	3	20
Analyze	3	3	1	10
Evaluate	3	3		
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

CS223: Program Elective-III :Secure Software Design & Enterprise Computing

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Differentiate between various software vulnerabilities.
2 Software process vulnerabilities for an organization.
3 Monitor resources consumption in a software.
4 Inter relate security and software development process.

Course Contents

		Hours
Unit 1	**Secure Software Design:** Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts, Perform security testing and quality assurance.	(08)
Unit 2	**Enterprise Application Development:** Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an enterprise system, Design and develop a multi-tier solution to a problem using technologies used in enterprise system, Present software solution.	(11)
Unit 3	**Enterprise Systems Administration:** Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, Monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email).	(08)
Unit 4	**Manage and troubleshoot:** Obtain the ability to manage and troubleshoot a network running multiple services, Understand the requirements of an enterprise network and how to go about managing them.	(08)
Unit 5	**Handle insecure exceptions and command/SQL injection:** Defend web and mobile applications against attackers, software containing minimum vulnerabilities and flaws.	(09)
Unit 6	**Case study** of DNS server, DHCP configuration and SQL injection attack	(04)

Text Books:

1 Theodor Richardson, Charles N Thies, "Secure Software Design", Jones & Bartlett, 1st edition,2012.

References:

1 Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, "Enterprise Software Security", Addison Wesley.

Useful Links:

1 https://nptel.ac.in/courses/106105166/ IIT Kharagpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	-	1	1	-	-	-	-	-	-	1	1
CO2	-	1	-	1	-	-	-	-	-	-	1	1
CO3	-	1	1	2	-	-	-	-	-	-	2	1
CO4	-	-	1	1	-	-	-	-	-	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5		3	20
Analyze		5	1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

CS233: Program Elective-III :Computer Vision

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60

Duration of ESE: 2 Hrs 30 Min

Course Outcome (CO): After completion of course, students would be able to:

1 Develop the practical skills necessary to build computer vision applications.

2 Exposure to object and scene recognition and categorization from images.

Course Contents

		Hours
Unit 1	**Overview:** computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis	(08)
Unit 2	**Edge detection:** Edge detection performance, Hough transform, corner detection	(09)
Unit 3	**Segmentation:** Morphological filtering, Fourier transform	(09)
Unit 4	**Feature extraction:** shape, histogram, color, spectral, texture, using CVIP tools, Feature analysis, feature vectors, distance /similarity measures, data preprocessing	(09)
Unit 5	**Pattern Analysis:** Clustering: K-Means, K-Medoids, Mixture of Gaussians Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods.	(09)
Unit 6	**Recent trends** in Activity Recognition, computational photography, Biometrics.	(04)

Text Books:

1 Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer;1st edition, 2011

2 Goodfellow, Bengio, Courville, "Deep Learning", MIT Press, 2017

References:

1 Robert B. Fisher Toby P. Breckon ,Kenneth Dawson-Howe , Andrew Fitzgibbon , Craig Robertson, "Dictionary of Computer Vision and Image Processing", Wiley-Blackwell; 2nd edition, 2013

Useful Links:

1 https://nptel.ac.in/courses/106106090/ IIT Madras

2 https://nptel.ac.in/courses/106102065/ IIT Delhi

3 https://nptel.ac.in/courses/106102063/ IIT Delhi

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	1	2	1	-	-	-	-	-	1	1
CO2	-	1	1	1	2	-	-	-	-	-	2	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze			1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

CS214: Program Elective-IV :Human and Computer Interaction

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand the structure of models and theories of human computer interaction and vision.

2 Design an interactive web interface on the basis of models studied.

Course Contents

		Hours
Unit 1	**Human: I/O channels:** Memory reasoning and problem solving; The computer: Devices: Memory processing and networks; Interaction: Models, frameworks, Ergonomics, styles, elements, interactivity, Paradigms.	(09)
Unit 2	**Interactive Design basics:** process, scenarios, navigation, screen design, Iteration and prototyping. HCI in software process, software life cycle, usability engineering, Prototyping in practice, design rationale. Design rules, principles, standards, guidelines, rules. Evaluation Techniques, Universal Design.	(12)
Unit 3	**Cognitive models**: Socio-Organizational issues and stake holder requirements, Communication and collaboration models, Hypertext, Multimedia and WWW.	(08)
Unit 4	**Mobile Ecosystem:** Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games, Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.	(08)
Unit 5	**Designing Web Interfaces:** Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.	(08)
Unit 6	**Recent Trends:** Speech Recognition and Translation, Multimodal System	(03)

Text Books:

1 Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004. (UNIT I , II & III)

2 Brian Fling, "Mobile Design and Development", 1st Edition, OReilly Media Inc., 2009. (UNIT – IV)

3 Bill Scott, Theresa Neil, "Designing Web Interfaces",1st Edition, OReilly, 2009. (UNIT-V,VI)

References:

1 Dix, "Human-Computer Interaction", Pearson Education India 3rd Edition,2004

2 Meena K, "Human Computer Interaction", Prentice Hall India Learning Private Limited,2014

Useful Links:

1 https://nptel.ac.in/courses/106106177/ IIT MADRAS

2 https://nptel.ac.in/courses/106103115/ IIT GUWAHATI

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	1	2	1	-	-	-	1	-	2	1
CO2	-	1	1	2	1	-	-	-	1	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze			1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-II) M. Tech. Computer Science & Engineering
CS224: Program Elective-IV :GPU Computing

Teaching Scheme		**Examination Scheme**	
Lectures	3 Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand concepts in parallel programming, implementation of programs on GPUs, debugging and profiling parallel programs

Course Contents

		Hours
Unit 1	**Introduction**: History, Graphics Processors, Graphics Processing Units, GPGPUs. Clock speeds, CPU and GPU comparisons, Heterogeneity, Accelerators, Parallel programming, CUDA OpenCL, Open ACC, Hello World Computation Kernels, Launch parameters, Thread hierarchy, Warps, Wave fronts, Thread blocks, Workgroups, Streaming multiprocessors, 1D, 2D, 3D thread mapping, Device properties, Simple Programs.	(13)
Unit 2	**Memory:** Memory hierarchy, DRAM, global, local, shared, private, local, textures, Constant Memory, Pointers, Parameter Passing, Arrays and dynamic Memory, Multi-dimensional Arrays, Memory Allocation, Memory copying across devices, Programs with matrices, Performance evaluation with different memories.	(07)
Unit 3	**Synchronization**: Memory Consistency, Barriers (local versus global), Atomics, Memory fence. Prefix sum, Reduction. Programs for concurrent Data Structures such as Worklists, Linked-lists. Synchronization across CPU and GPU **Functions**: Device functions, Host functions, Kernels functions, Using libraries (such as Thrust), and developing libraries.	(10)
Unit 4	**Support**: Debugging GPU Programs. Profiling, Profile tools, Performance aspects **Streams**: Asynchronous processing, tasks, Task-dependence, Overlapped data transfers, Default Stream, Synchronization with streams. Events, Event-based-Synchronization - Overlapping data transfer and kernel execution, pitfalls.	(08)
Unit 5	**Case Studies**: Image Processing, Graph algorithms, Simulations, Deep Learning	(05)
Unit 6	**Advanced topics**: Dynamic parallelism, Unified Virtual Memory, Multi-GPU processing, Peer access, Heterogeneous processing	(05)

Text Books:

1 David Kirk, Wen-mei Hwu, Morgan Kaufman, "Programming Massively Parallel Processors: A Hands-on Approach", 2010. (ISBN: 978-0123814722)

2 Shane Cook, Morgan Kaufman, "CUDA Programming: A Developer's Guide to Parallel

Computing with GPUs", 2012. (ISBN: 978-0124159334)

References:

1 David Kirk, Wen-mei Hwu, "Programming Massively Parallel Processors: A Hands-on Approach", Morgan Kaufman; 2010 (ISBN: 978-0123814722)

2 Shane Cook, "CUDA Programming: A Developer's Guide to Parallel Computing with GPUs", Morgan Kaufman; 2012 (ISBN: 978-0124159334)

Useful Links:

1 https://nptel.ac.in/courses/106102114/ IIT Delhi

2 https://nptel.ac.in/courses/106104120/ IIT Kanpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	2	2	2	1	-	-	-	-	1	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze			1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

CS234: Program Elective-IV :Digital Forensics

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand relevant legislation and codes of ethics.
2 Explain computer forensics and digital detective and various processes, policies and procedures.
3 Understand E-discovery, guidelines and standards, E-evidence, tools and environment.
4 Understand Email and web forensics and network forensics.

Course Contents

		Hours
Unit 1	**Digital Forensics Science:** Forensics science, computer forensics, and digital forensics. **Computer Crime:** Criminalistics as it relates to the investigative process, analysis of cyber-criminalistics area, holistic approach to cyber-forensics	(09)
Unit 2	**Cyber Crime Scene Analysis:** Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation	(08)
Unit 3	**Evidence Management & Presentation:** Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.	(09)
Unit 4	**Computer Forensics:** Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, Complete a case, Critique a case, **Network Forensics:** open-source security tools for network forensic analysis, requirements for preservation of network data.	(10)
Unit 5	**Mobile Forensics:** mobile forensics techniques, mobile forensics tools. Legal Aspects of Digital Forensics**:** IT Act 2000, amendment of IT Act 2008	(08)
Unit 6	**Recent trends** in mobile forensic technique and methods to search and seizure electronic evidence	(04)

Text Books:

1 John Sammons, "The Basics of Digital Forensics", Syngress; 2nd edition, 2014

2 John Vacca, "Computer Forensics: Computer Crime Scene Investigation", Laxmi Publications, 1st edition 2015

References:

1 Alex Samm , Dale Joseph, Shiva V. N Parasram, "Digital Forensics with Kali Linux: Perform data acquisition, digital investigation, and threat analysis using Kali Linux tools ",Packt Publishing Limited 2017

2 Nilakshi Jain, Dhananjay R. Kalbande, "Digital Forensic: The Fascinating World of Digital Evidences", Wiley. 2016

Useful Links:

1 https://nptel.ac.in/courses/106106178/ IIT MADRAS

2 https://nptel.ac.in/courses/106106129/ IIT MADRAS

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	1	1	-	-	3	-	1	-	1	1
CO2	-	-	1	1	-	-	3	-	2	-	1	1
CO3	-	-	1	1	-	-	3	-	1	-	1	1
CO4	-	-	1	1	-	-	3	-	2	-	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply	5	5	3	20
Analyze			1	1
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

CS215: Program Elective-V: Mobile Technologies and Services

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1. Identify the target platform and users and be able to define and sketch a mobile application.
2. Understand the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and PhoneGap.
3. Design and develop a mobile application prototype in one of the platform.

Course Contents

		Hours
Unit 1	**Introduction to Mobile Computing**: Introduction:, Introduction to Android, Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User	(08)
Unit 2	**More on Uis**: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis. Storing and Retrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider	(08)
Unit 3	**Communications via Network and the Web:** State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics	(10)
Unit 4	**Putting It All Together:** Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android Multimedia: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia	(09)
Unit 5	**Platforms and Additional Issues:** Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing, Security and Hacking, Active Transactions, More on Security, Hacking Android	(08)
Unit 6	**Recent Trends:** Recent trends in Communication protocols for IOT nodes, mobile computing techniques in IOT, agents based communications in IOT	(05)

Text Books:

1 Wei-Meng Lee, "Beginning Android™ 4 Application Development", John Wiley & Sons, 2012.

References:

1 Pradeep Kothari , "Android Application Development Black book", Dreamtech Press, 2014.

2 Kloss, "Android Apps With App Inventor", Pearson Education, 1st edition, 2013.

Useful Links:

1 https://nptel.ac.in/courses/106106156 IIT Madras

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	1	2	-	-	-	-	-	-	2	1
CO2	-	1	-	2	-	-	-	-	-	-	2	1
CO3	-	2	1	2	-	-	-	-	-	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply			3	20
Analyze	5	5	1	10
Evaluate				
Create				
Total	15	15	10	60

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

CS225: Program Elective-V: Compiler for HPC

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Understand the structure of compiler.

2 Understand parallel loops, data dependency and exception handling and debugging in compiler.

Course Contents

		Hours
Unit 1	**High Performance Systems:** Structure of a Compiler, Programming Language, Features, Languages for High Performance	(07)
Unit 2	**Data Dependence:** Data Dependence in Loops, Data Dependence in Conditionals, Data Dependence in Parallel Loops, Program Dependence Graph. Scalar Analysis with Factored Use-Def Chains: Constructing Factored Use-Def Chains, FUD Chains for Arrays, Induction Variables Using FUD Chains, Constant Propagation with FUD Chains, Data Dependence for Scalars. Data Dependence Analysis for Arrays.	(07)
Unit 3	**Loop Restructuring and Optimization for Locality:** Array Region Analysis, Pointer Analysis, I/O Dependence, Procedure Calls, Inter-procedural Analysis. Simple Transformations, Loop Fusion, Loop Fission, Loop Reversal, Loop Interchanging, Loop Skewing, Linear Loop Transformations, Strip-Mining, Loop Tiling, Other Loop Transformations, and Inter-procedural Transformations, Single Reference to Each Array, Multiple References, General Tiling, Fission and Fusion for Locality.	(10)
Unit 4	**Concurrency Analysis:** Concurrency from Sequential Loops, Concurrency from Parallel Loops, Nested Loops, Round off Error, Exceptions and Debuggers. Vector Analysis: Vector Code, Vector Code from Sequential Loops, Vector Code from For all Loops, Nested Loops, Round off Error, Exceptions, and Debuggers, Multi-vector Computers	(10)
Unit 5	**Message-Passing Machines:** SIMD Machines, MIMD Machines, Data Layout, Parallel Code for Array Assignment, Remote Data Access, Automatic Data Layout. Scalable Shared-Memory Machines: Global Cache Coherence, Local Cache Coherence, Latency Tolerant Machines	(10)

Unit 6 Recent Trends:

Recent trends in compiler design for high performance computing and message passing machines and scalable shared memory machine. (04)

Text Books:

1 Michael Wolfe, "High-Performance Compilers for Parallel Computing", Pearson, 1st edition.

References:

1 Kevin Dowd, "High Performance Computing", O'Reilly Media, 1st edition.

2 John Levesque, Gene Wagenbreth, "High Performance Computing: Programming and Applications", Chapman and Hall/CRC, 1st edition, 2010.

Useful Links:

1 https://nptel.ac.in/courses/106108055/ IISC Bangalore

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	1	2	-	1	-	-	-	-	1	1	1
CO2	-	1	2	-	1	-	-	-	-	-	2	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	10
Apply	5	5	3	20
Analyze				20
Evaluate				
Create			1	
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-II) M. Tech. Computer Science & Engineering
CS235: Program Elective-V: Optimization Techniques

Teaching Scheme		**Examination Scheme**	
Lectures	3Hrs/week	**CT1**	15
Tutorial	--	**CT2**	15
Total Credits	**3**	**TA**	10
		ESE	60
		Duration of ESE: 2 Hrs 30 Min	

Course Outcome (CO): After completion of course, students would be able to:

1 Formulate optimization problems.
2 Understand and apply the concept of optimality criteria for various types of optimization problems.
3 Solve various constrained and unconstrained problems in Single variable as well as multivariable.
4 Apply the methods of optimization in real life situation.

Course Contents

		Hours
Unit 1	**Optimization:** Engineering application of Optimization, Formulation of design problems as mathematical programming problems.	(07)
Unit 2	**Optimization Algorithms:** General Structure of Optimization Algorithms, Constraints, The Feasible Region	(07)
Unit 3	**Branches of Mathematical Programming:** Optimization using calculus, Graphical Optimization, Linear Programming, Quadratic Programming, Integer Programming, Semi Definite Programming.	(11)
Unit 4	Optimization Algorithms like Genetic Optimization, Particle Swarm Optimization, Ant Colony Optimization etc.	(12)
Unit 5	Real life Problems and their mathematical formulation as standard programming problems.	(06)
Unit 6	**Recent trends:** Applications of ant colony optimization, genetics and linear and quadratic programming in real world applications.	(05)

Text Books:

1 Laurence A.Wolsey, "Integer programming" Wiley publication, ISBN978-0-471-28366-9, 1998.
2 Andreas Antoniou, Wu-Sheng Lu, "Practical Optimization Algorithms and Engineering Applications", Springer.
3 Edwin K., P. Chong, Stanislaw h. Zak, "An Introduction to Optimization", 4th edition, Wiley pubulication.

References:

1 Dimitris Bertsimas, Robert Weismantel, “Optimization over integers”, Dynamic Ideas, ISBN 978-0-9759146-2-5, 2005
2 John K. Karlof, “Integer programming: theory and practice”, CRC Press, ISBN 978-0-8493-1914-3, 2006.
3 H. Paul Williams, “Logic and Integer Programming” Springer, ISBN 978-0-387-92279-9, 2009.
4 Michael Jünger, Thomas M. Liebling, Denis Naddef, George Nemhauser, William R. Pulleyblank, Gerhard Reinelt, Giovanni Rinaldi, Laurence A. Wolsey, and eds., “50 Years of Integer Programming” 1958-2008: From the Early Years to the State-of-the- Art. Springer, ISBN 978-3- 540-68274-5, 2009.
5 Der-San Chen, Robert G. Batson, Yu Dang, “Applied Integer Programming: Modeling and Solution”, John Wiley and Sons, ISBN 978-0-470-37306-4, 2010.

Useful Links:

1 https://nptel.ac.in/courses/111105039/ IIT Kharagpur

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	1	1	1	1	1	-	-	-	-	-	1	2
CO2	1	2	1	-	1	-	-	-	-	-	1	2
CO3	1	1	1	1	2	-	-	-	-	-	1	1
CO4	1	2	-	1	1	-	-	-	-	-	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Assessment Pattern:

Knowledge Level	CT1	CT2	TA	ESE
Remember	5	5	3	10
Understand	5	5	3	20
Apply			3	20
Analyze	5	5		10
Evaluate			1	
Create				
Total	15	15	10	60

Government College of Engineering, Karad
First Year (Sem-II) M. Tech. Computer Science & Engineering
AU219: Audit Course – II :Constitution of India

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CT1**	-
Tutorial	--	**CT2**	-
Total Credits	Audit	**TA**	-
		ESE	-
		Duration of ESE:	

Course Outcome (CO): After completion of course, students would be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

Course Contents

		Hours
Unit 1	**History of Making of the Indian Constitution:** History Drafting Committee, (Composition & Working)	(04)
Unit 2	**Philosophy of the Indian Constitution:** Preamble Salient Features	(04)
Unit 3	**Contours of Constitutional Rights & Duties:** Fundamental Rights Right to Equality Right to Freedom Right against Exploitation Right to Freedom of Religion Cultural and Educational Rights Right to Constitutional Remedies Directive Principles of State Policy, Fundamental Duties.	(04)
Unit 4	**Organs of Governance:** Parliament, Composition, Qualifications and Disqualifications Powers and Functions Executive, President, Governor Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions	(04)

Unit 5 **Local Administration:**

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.
Pachayati raj: Introduction, PRI: Zila Pachayat.
Elected officials and their roles, CEO Zila Pachayat: Position and role.
Block level: Organizational Hierarchy (Different departments),
Village level: Role of Elected and Appointed officials,
Importance of grass root democracy. (04)

Unit 6 **Election Commission:**

Election Commission: Role and Functioning.
Chief Election Commissioner and Election Commissioners.
State Election Commission: Role and Functioning.
Institute and Bodies for the welfare of SC/ST/OBC and women (04)

Text Books:

1 "The Constitution of India", Government Publication, 1950 (Bare Act).
2 Dr. S. N. Busi, Dr. B. R. Ambedkar, "Framing of Indian Constitution", 1st Edition, 2015.

References:

1 M. P. Jain, "Indian Constitution Law", 7th Edition, Lexis Nexis, 2014.
2 D.D. Basu, "Introduction to the Constitution of India", Lexis Nexis, 2015.

Useful Links:

1 https://nptel.ac.in/courses/103107084/Script.pdf
2 https://nptel.ac.in/syllabus/109103022/ IIT Guwahati

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	1	1	-	3	1	-	1
CO2	-	-	-	-	-	1	1	-	3	1	-	1
CO3	-	-	-	-	-	1	1	-	3	2	-	1
CO4	-	-	-	-	-	1	1	-	3	2	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

AU229: Audit Course – II: Pedagogy Studies

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CT1**	-
Tutorial	--	**CT2**	-
Total Credits	Audit	**TA**	-
		ESE	-
		Duration of ESE:	

Course Outcome (CO): After completion of course, students would be able to:

1. Understand pedagogical practices are being used by teachers in formal and informal classrooms in developing countries.
2. Understand the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners.
3. Understand how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

Course Contents

		Hours
Unit 1	**Introduction and Methodology:** Aims and rationale, Policy background, Conceptual framework and Terminology, Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions., Overview of methodology and Searching	(04)
Unit 2	**Thematic overview:** Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education	(02)
Unit 3	**Evidence on the effectiveness of pedagogical practices** Methodology for the in depth stage: quality assessment of included studies, How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy	(04)
Unit 4	**Theory of change:** Strength and nature of the body of evidence for effective pedagogical practices, Pedagogic theory and pedagogical approaches, Teachers' attitudes and beliefs and Pedagogic strategies	(02)
Unit 5	**Professional development:** alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes	(04)
Unit 6	**Research gaps and future directions:** Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact	(02)

Text Books:

1 Ackers J, Hardman F, "Classroom interaction in Kenyan primary schools", Compare, 31 (2): 245-261, 2001.
2 Agrawal M, "Curricular reform in schools: The importance of evaluation", Journal of Curriculum Studies, 36 (3): 361-379, 2004.
3 Akyeampong K, "Teacher training in Ghana - does it count?" Multi-site teacher education research project (MUSTER) country report 1. London: DFID, 2003.

References:

1 Akyeampong K, Lussier K, Pryor J, Westbrook J (2013), "Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
2 Alexander RJ, "Culture and pedagogy: International comparisons in primary education", Oxford and Boston: Blackwell.
3 Chavan M,"Read India: A mass scale, rapid, 'learning to read' campaign".

Useful Links:

1 www.pratham.org/images/resource%20working%20paper%202.pdf.

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	1	1	3	1	3	-	1	1
CO2	-	-	-	-	1	1	3	1	3	-	1	1
CO3	-	-	-	-	1	1	3	1	3	-	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

AU239: Audit Course – II: Stress Management by Yoga

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CT1**	-
Tutorial	--	**CT2**	-
Total Credits	Audit	**TA**	-
		ESE	-
		Duration of ESE:	

Course Outcome (CO): After completion of course, students would be able to:

1 Develop healthy mind in a healthy body thus improving social health.

2 Improve efficiency.

Course Contents

		Hours
Unit 1	Definitions of Eight parts of yog. (Ashtanga)	(08)
Unit 2	**Yam and Niyam:** Do`s and Don't's in life. i) Ahinsa, satya, astheya ii) Shaucha, santosh, tapa	(04)
Unit 3	**Yam and Niyam:** Do's and Don't's in life. i) bramhacharya and aparigraha ii) swadhyay, ishwarpranidhan	(04)
Unit 4	**Asan and Pranayam:** Various yog poses and their benefits for mind & body	(04)
Unit 5	**Asan and Pranayam:** Regularization of breathing techniques and its effects-Types of pranayam	(02)
Unit 6	**Types of Pranayam**	(02)

Text Books:

1 "Yogic Asanas for Group Training-Part-I", Janardan Swami Yogabhyasi Mandal, Nagpur.

References:

1 Swami Vivekananda, "Rajayoga or conquering the Internal Nature", AdvaitaAshrama (Publication Department), Kolkata.

2

Useful Links:

1 https://nptel.ac.in/courses/109105113/ IIT KHARAGPUR

2 https://nptel.ac.in/courses/109106059/6 IIT MADRAS

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	1	1	-	3	-	-	-
CO2	-	-	-	-	-	1	1	-	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad

First Year (Sem-II) M. Tech. Computer Science & Engineering

AU249: Audit Course – II: Personality Development through Life Enlightenment Skills

Teaching Scheme		**Examination Scheme**	
Lectures	2 Hrs/week	**CT1**	-
Tutorial	--	**CT2**	-
Total Credits	Audit	**TA**	-
		ESE	-
		Duration of ESE:	

Course Outcome (CO): After completion of course, students would be able to:

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students.

Course Contents

		Hours
Unit 1	**Neetisatakam-Holistic development of personality:** • Verses- 19,20,21,22 (wisdom) • Verses- 29,31,32 (pride & heroism) • Verses- 26,28,63,65 (virtue)	(04)
Unit 2	**Neetisatakam-Holistic development of personality:** • Verses- 52,53,59 (dont's) • Verses- 71,73,75,78 (do's)	(04)
Unit 3	**Approach to day to day work and duties:** • Shrimad Bhagwad Geeta : • Chapter 2-Verses 41, 47,48, • Chapter 3-Verses 13, 21, 27, 35,	(04)
Unit 4	**Approach to day to day work and duties:** • Shrimad Bhagwad Geeta : • Chapter 6-Verses 5,13,17,23, 35, • Chapter 18-Verses 45, 46, 48.	(04)
Unit 5	**Statements of basic knowledge:** • Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 • Chapter 12 -Verses 13, 14, 15, 16,17, 18 • Personality of Role model.	(04)
Unit 6	**Shrimad Bhagwad Geeta:** • Chapter2-Verses 17, Chapter 3-Verses 36,37,42, • Chapter 4-Verses 18, 38,39 • Chapter18 – Verses 37,38,63	(04)

Text Books:

1 Swami Swarupananda , "Srimad Bhagavad Gita" , Advaita Ashram (Publication Department), Kolkata

References:

1 P.Gopinath, Bhartrihari's Three Satakam (Niti-sringar-vairagya), Rashtriya Sanskrit Sansthanam, New Delhi.

Useful Links:

1 https://www.scribd.com/document/352547910/Bhagvad-Geeta-for-Common-Man-pdf

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	1	1	-	3	-	-	-
CO2	-	-	-	-	-	-	1	1	3	-	-	-
CO3	-	-	-	-	-	1	-	1	3	-	-	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad
Second Year (Sem-III) M. Tech. Computer Science & Engineering
CS301: Dissertation Phase-I

Laboratory Scheme		**Examination Scheme**	
Practical	14 Hrs/week	**CA**	**100**
Total Credits	**7**	**ESE**	**100**

Course Outcome(CO): After completion of course, students will be able to:

1 Identify self-learning topics.
2 Explore the survey literature and contact resource persons for the selected topic of research.
3 Develop oral and written communication skills to present and defend their work in front of technically qualified audience.

Course Contents

The Project Work should preferably be a problem with research potential and should involve scientific research, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution. It should be based on the area in which the candidate has undertaken the dissertation work as per the common instructions for all branches of M. Tech. The examination shall consist of the preparation of report consisting of a detailed problem statement and a literature review. The preliminary results (if available) of the problem may also be discussed in the report. The work has to be presented in front of the examiners panel set by Head and PG coordinator. The candidate has to be in regular contact with his guide and the topic of dissertation must be mutually decided by the guide and student.

Syllabus Contents:
The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following:

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Report and presentation

Guidelines for Dissertation Phase – I:

- As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.
- The dissertation may be carried out preferably in-house i.e. department's laboratories and centres OR in industry allotted through department's T & P coordinator.
- After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include Springer/Science Direct. In case of Industry sponsored projects, the relevant application notes, while papers, product catalogues should be referred and reported.

- Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.
- Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, a record of continuous progress.
- Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the phase-I work.

List of Submission:

1. Dissertation report should be prepared using Latex.

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	-	-	2	3	2	-	2	-	1
CO2	-	-	3	-	-	1	2	-	-	1	2	-
CO3	-	-	-	-	-	1	2	3	-	2	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad
Second Year (Sem-III) M. Tech. Computer Science & Engineering
CS302: MOOCs / OPEN COURSE

Teaching Scheme		**Examination Scheme**	
Lectures	-	**CT1**	-
Tutorials	-	**CT2**	-
Total Credits	**3**	**TA**	-
		ESE	-
		Duration of ESE :	

Course Outcome(CO): After completion of course, students will be able to:

1 Learn independently the modern tools and technology.
2 Develop skills for solving problems for research project.
3 Identify the self learning topics.

Course Contents

Online courses available on digital platform like MOOCs/ NPTEL/ Coursera etc during the academic semester will be reviewed and listed by departmental faculty board before start of every semester. Suitable course for registered candidate will be recommended by Guide and Programme Head considering skill sets and knowledge required for dissertation work of the individual candidate (from the list). It shall have minimum 8-12 weeks duration, peer graded assignment and examination to award grade by online course offering agency. The report of course completed with copy of Grade Report shall be submitted to the examination section. In case online course is not available, departmental committee will specially design syllabus for course under self-learning mode and guide will conduct end semester examination to award the grade.

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	-	3	1	3	1	1	3	1	1	1
CO2	-	-	-	3	-	3	-	1	3	-	1	1
CO3	-	-	1	3	-	3	1	-	3	-	1	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Government College of Engineering, Karad
Second Year (Sem-IV) M. Tech. Computer Science & Engineering
CS401: Dissertation Phase-II

Laboratory Scheme		**Examination Scheme**	
Practical	32 Hrs/week	**CA**	**100**
Total Credits	**16**	**ESE**	**200**

Course Outcome(CO): After completion of course, students will be able to:

1 Demonstrate techno socio aspects for problem solutions
2 Test and validate designed system towards fault tolerance.
3 Produce research findings in terms of possible technical publications and IPRs.

Course Contents

It is a continuation of Project work started in semester III. Student has to submit the report in prescribed format and also present a seminar. The dissertation should be presented in standard format as provided by the department. The candidate has to prepare a detailed project report consisting of introduction of the problem, problem statement, literature review, objectives of the work, methodology (experimental set up or numerical details as the case may be) of solution, results and discussion. The report must bring out the conclusions of the work and future scope for the study. . The work has to be presented in front of the examiners panel consisting of an approved external examiner, an internal examiner and a guide, co-guide etc. as decided by the Head and PG coordinator. The candidate has to be in regular contact with his guide.

The dissertation phase II is based on a report prepared by the students on dissertation allotted to them.
It may be based on:

- Experimental verification / Proof of concept.
- Design, fabrication, testing of Communication System.
- The viva-voce examination will be based on the above report and work.

Guidelines for Dissertation Phase – II:

- During phase – II, student is expected to exert on detail design, development, verification and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.
- Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, A record of continuous progress (Log Book).
- Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension of work.

List of Submission:

1. Dissertation report should be prepared using Latex.

Mapping of COs and POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2
CO1	-	-	3	3	-	-	-	-	-	1	-	1
CO2	-	-	2	3	-	-	-	-	-	1	1	-
CO3	-	-	-	-	3	2	1	1	-	1	-	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)