SHRI VENKATESHWARA UNIVERSITY

Syllabus

M.TECH (Computer Science and Engineering)

(Two Years Post Graduation Programme)

(w.e.f. 2019-20)

SCHOOL OF ENGINEERING & TECHNOLOGY

SEMESTER-II

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Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1	MCS-201	Advance Algorithms	3	0	0	20	10	30		70		100	3
2	MCS-202	Soft Computing	3	0	0	20	10	30		70		100	3
3	MCS-031	Data Preparation and Analysis	3	0	0	20	10	30		70		100	3
4	MCS-041	Human and Computer Interaction	3	0	0	20	10	30		70		100	3
5	MCS-211	Advance Algorithms LAB	0	0	4				25		25	50	2
6	MCS-212	Soft Computing LAB	0	0	4				25		25	50	2
7	MCS-221	Mini Project	0	0	4				50		50	100	2
8	AUD-102	DISASTER MANAGEMENT	2	0	0	20	10	30		70		1000	0
		Total										700	18

Course Code	MCS-201
Course Name	Advanced Algorithms
Credits	3
Pre-Requisites	UG level course in Algorithm Design and Analysis

COURSE OBJECTIVE
• Introduce students to the advanced methods of designing and analyzing algorithms.
• The student should be able to choose appropriate algorithms and use it for a specific problem.
• To familiarize students with basic paradigms and data structures used to solve advanced algorithmic problems.
• Students should be able to understand different classes of problems concerning their computation difficulties.
• To introduce the students to recent developments in the area of algorithmic design.

LECTURE WITH BREAKUP	**NO. OF LECTURES**
Unit1 **Sorting:** Review of various sorting algorithms, topological sorting **Graph:** Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkasra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.	6
Unit 2 **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.	8
Unit 3 **Flow-Networks:** Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm. **Matrix Computations:** Strassen's algorithm and introduction to divide andconquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.	9
Unit 4 **Shortest Path in Graphs:** Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming. **Modulo Representation of integers/polynomials:** Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem. **Discrete Fourier Transform (DFT):** In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm	10
Unit 5 **Linear Programming:** Geometry of the feasibility region and Simplex algorithm **NP-completeness:** Examples, proof of NP-hardness and NP-completeness. **One or more of the following topics based on time and interest** Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm	10
Unit 6 Recent Trands in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.	5

COURSE OUTCOMES
After completion of course, students would be able to:
• Analyze the complexity/performance of different algorithms.
• Determine the appropriate data structure for solving a particular set of problems.
• Categorize the different problems in various classes according to their complexity.
• Students should have an insight of recent activities in the field of the advanced data structure.

References:

1. "Introduction to Algorithms" byCormen, Leiserson, Rivest, Stein.
2. "The Design and Analysis of Computer Algorithms" by Aho, Hopcroft, Ullman.
3. "Algorithm Design" by Kleinberg and Tardos.

Course Code	MCS-202
Course Name	Soft Computing
Credits	3
Pre-Requisites	Basic knowledge of mathematics

COURSE OBJECTIVE
• To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
• To implement soft computing based solutions for real-world problems.
• To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.
• To provide studentan hand-on experience on MATLAB to implement various strategies.

LECTURE WITH BREAKUP	NO. OF LECTURES
Unit 1 **INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS:** Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics	7
Unit 2 **FUZZY LOGIC:** Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, FuzzyExpert Systems, Fuzzy Decision Making.	8
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.	5
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 Trands in deep learning, various classifiers, neural networks and genetic algorithm. Implementation of recently proposed soft computing techniques.	5

COURSE OUTCOMES
After completion of course, students would be able to:
• Identify and describe soft computing techniques and their roles in building intelligent machines
• Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering

References

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

Course Code	MCS-031
Course Name	Data Preparation and Analysis
Credits	3
Pre-Requisites	

COURSE OBJECTIVE
• To prepare the data for analysis and develop meaningful Data Visualizations

LECTURE WITH BREAKUP	**NO. OF LECTURES**
Unit1: **Data Gathering and Preparation:** Data formats, parsing and transformation, Scalability and real-time issues	9
Unit2: **Data Cleaning:** **Consistency checking, Heterogeneous and missing data, Data Transformation and segmentation**	11
Unit3: **Exploratory Analysis:** **Descriptive and comparative statistics, Clustering and association, Hypothesis generation**	13
Unit4: **Visualization:** **Designing visualizations, Time series, Geolocated data, Correlations and connections, Hierarchies and networks, interactivity**	15

COURSE OUTCOMES
After completion of course, students would be:
• Able to extract the data for performing the Analysis.

References:

1. Making sense of Data : A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt

Course Code	MCS-041
Course Name	Human and Computer Interection

Credits	3
Pre-Requisites	

COURSE OBJECTIVE

- Learn the foundations of Human Computer Interaction
- Be familiar with the design technologies for individuals and persons with disabilities
- Be aware of mobile Human Computer interaction.

LECTURE WITH BREAKUP	**NO. OF LECTURES**
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.	9
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.	8
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.	8
Unit 5: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.	8
Unit 6: Recent Trends: Speech Recognition and Translation, Multimodal System	3

COURSE OUTCOMES

After completion of course, students would be:

- Understand the structure of models and theries of human computer interaction and vision.\
- Design an interactive web interface on the basis of models studied.

References:

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", First Edition , O Reilly Media Inc., 2009 (UNIT – IV)
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O Reilly, 2009.(UNIT-V)

AUDIT : DISASTER MANAGEMENT

Course Objectives: -Students will be able to:

1. learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. critically 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.
4. critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Syllabus

Units	CONTENTS	Hours
1	**Introduction** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	4
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.	4
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	4
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.	4
5	**Risk Assessment** Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.	4
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.	4

SUGGESTED READINGS:

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